



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

www.eecworld.com

CONTR. LIC. #AHAZ-743267

515 N. CABRILLO PARK DRIVE, SUITE #120
SANTA ANA, CALIFORNIA 92701
PHONE (714) 667-2300 FAX (714) 667-2310

GROUNDWATER MONITORING WELL INSTALLATION REPORT

Performed At:

Northrop Grumman Corporation
Former Y-12 Facility
301 East Orangethorpe Avenue
Anaheim, California

March 29, 2002

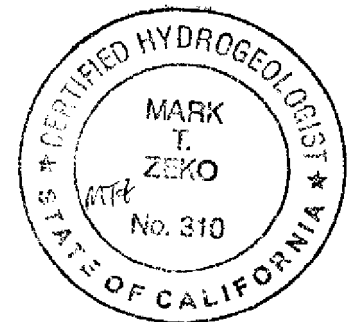
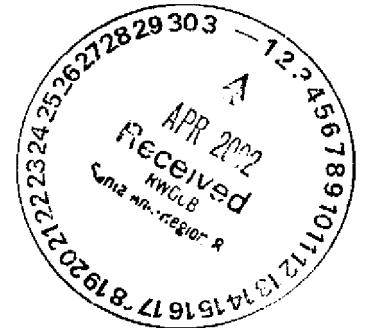
EEC Job No. S487-8/2

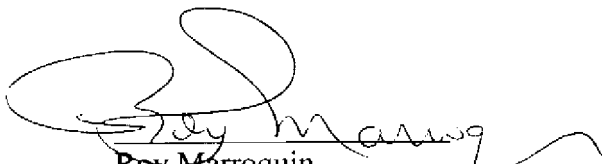
Prepared for:

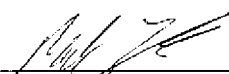
Northrop Grumman Corporation
One Hornet Way
El Segundo, California

Prepared By:

Environmental Engineering & Contracting, Inc.
515 N. Cabrillo Park Drive, Suite 120
Santa Ana, California 92701




Roy Marroquin
Senior Hydrogeologist
Senior Project Manager


Mark Zeko
Registered Geologist #6278
Certified Hydrogeologist #310

**GROUNDWATER MONITORING WELL
INSTALLATION REPORT**

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Table of Contents

Table of Contents	ii
1.0 INTRODUCTION	1
2.0 BACKGROUND	3
2.1 Site Description	3
2.2 Site Geology	3
2.3 Site Hydrogeology	3
2.4 Previous Investigations	3
3.0 METHODOLOGY	5
3.1 Health and Safety Plan	5
3.2 Permits and Bonds	5
3.3 Utility Clearance	5
3.4 Soil Boring	6
3.5 Geophysical Logging	6
3.6 Well Installation	7
3.7 Well Development	8
3.8 Groundwater Sampling	8
3.9 Waste Management	9
3.10 Well Survey	9
3.11 Water Level Elevations	9
4.0 WELL INVESTIGATION FINDINGS	10
4.1 Soil Boring	10
4.2 Groundwater Elevation and Flow Direction	10
4.3 Groundwater Analytical Results	10
5.0 REGIONAL PLUME PERSPECTIVE	12
5.1 Shallow Zone of Upper Principal Aquifer	12
5.1.1 TCE	12
5.1.2 PCE	12
5.2 Middle to Lower Zone of Upper Principal Aquifer	13
5.2.1 TCE	13
5.2.2 PCE	13
5.3 Upper Principal Aquifer Composite	14
5.3.1 TCE	14
5.3.2 PCE	14
6.0 CONCLUSIONS	15

Table of Contents

TABLES

Table 1	Summary of Groundwater Analytical Results
Table 2	Summary of Well Survey Data
Table 3	Summary of Groundwater Elevation Data
Table 4	Summary of TCE and PCE Data - Upper Principal Aquifer
Table 5	Summary of TCE and PCE Data - Lower Principal Aquifer

FIGURES

Figure 1	Site Location
Figure 2	Site Vicinity
Figure 3	Monitoring Well Cluster Construction Details
Figure 4	Potentiometric Surface -- February 19, 2002
Figure 5	Distribution of TCE Upper Principal Aquifer, Shallow Zone
Figure 6	Distribution of PCE Upper Principal Aquifer, Shallow Zone
Figure 7	Distribution of TCE Upper Principal Aquifer, Lower Zone
Figure 8	Distribution of PCE Upper Principal Aquifer, Lower Zone
Figure 9	Distribution of TCE Principal Aquifer
Figure 10	Regional TCE Plume
Figure 11	Distribution of PCE Principal Aquifer
Figure 12	Regional PCE Plume

APPENDICES

Appendix A	Permits
Appendix B	Soil Boring Logs
Appendix C	Geophysical Logs
Appendix D	Laboratory Data Sheets
Appendix E	Waste Management Laboratory Data Sheets



GROUNDWATER MONITORING WELL INSTALLATION REPORT

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

1.0 INTRODUCTION

This report presents a summary of field procedures, findings, and conclusions associated with the well installation program conducted near the former Northrop Grumman Corporation (NGC) Y-12 facility, located at 301 East Orangethorpe Avenue, Anaheim, California. The field work associated with this project was conducted between December 17, 2001 and January 4, 2002. The installation of additional groundwater wells near the former NGC Y-12 facility was prompted by a request from the California Regional Water Quality Control Board (RWQCB) in a letter dated April 24, 2001. Subsequent conversations ensued among the RWQCB, the Orange County Water District (OCWD), and NGC and a work plan consisting of the installation of one monitoring well cluster was submitted to the RWQCB on August 15, 2001.

Groundwater quality in the Anaheim-Fullerton area has been the subject of an on-going study by the OCWD. The OCWD has documented a dissolved volatile organic compound (VOC) groundwater plume primarily consisting of trichloroethene (TCE) and tetrachloroethene (PCE) which extends approximately 2.5 miles upgradient and approximately 1.5 miles downgradient of the former Y-12 site. Regional groundwater data from OCWD indicates VOC concentrations are greater upgradient of the site and generally decrease downgradient of the site.

The objectives of this investigation are outlined below:

- 1) Comply with the RWQCB request to acquire additional groundwater quality data to further refine the lateral and vertical extent of VOCs downgradient of the site.
- 2) Obtain additional plume characterization data to demonstrate that the bulk of VOC impacts observed in the groundwater on and off site is from upgradient VOC sources.
- 3) Support conclusions that no further characterization is required.

To meet these objectives, one well cluster consisting of three monitoring wells was installed at the intersection of National Street and Liberty Avenue approximately 650 feet west (downgradient) of the site. Additional vertical plume delineation was accomplished by completing one of the monitoring wells in the cluster in the shallow portion of the

upper Principal Aquifer (screened between 110 and 120 feet below ground surface [bgs]) and one in the middle to lower portion of the upper Principal Aquifer (screened between 190 and 200 feet bgs). Additionally, at the request of the RWQCB, one monitoring well within the cluster was completed within the depth interval that perched groundwater is occasionally encountered beneath the site (screened between 80 and 90 feet bgs).

Groundwater data collected from this and other NGC wells was compared with water quality data collected from OCWD and other wells located upgradient and downgradient. These data reveal VOC concentrations (particularly TCE and PCE) are greater upgradient and generally decrease across the site. Both lateral and vertical TCE and PCE plume delineation objectives have been accomplished during this well installation event and the data generated from this and other wells in the area further supports NGC contention that the site has had a minimal contribution to the VOC mass observed in the plume and that no additional characterization work is necessary at or in the vicinity of the site. Specifically, this report presents a brief site background, field methodology, findings, regional plume perspective, and conclusions.

2.0 BACKGROUND

This section presents a brief summary of the site description, site geology, site hydrogeology, and previous site investigations.

2.1 Site Description

The former Y-12 facility is located between Harbor Blvd and Raymond Avenue on the north site of Orangethorpe Avenue at 301 East Orangethorpe Avenue in the city of Anaheim, California (Figure 1). Facility operations began at the site in 1962. Site operations primarily consisted of manufacturing floor beams for Boeing 747 airplanes. NGC ceased operations at the site in 1994. Operations at the facility included the use and storage of petroleum and chlorinated solvents. In 1996, EMPI, an aftermarket automobile parts manufacturer, purchased the property and is the current tenant.

2.2 Site Geology

The site is located within the Orange County Coastal Plain. The Coastal Plain is underlain by a thick sequence of marine and sedimentary rocks. The site is underlain by approximately 200 feet of unconsolidated sediments. The upper 90 feet is predominately composed of sand interbedded with silt and clay. Regionally, the 90 to 100-foot interval is characterized as an aquitard. Between 100 and 200 feet bgs, the formation consists primarily of poorly-graded sand.

2.3 Site Hydrogeology

The former Y-12 facility is located within the Forebay portion of the Orange County Groundwater Basin. The first significant groundwater underlying the site occurs at a depth between 110 and 130 feet bgs within a water-bearing zone defined by the Orange County Water District (OCWD) as the Principal Aquifer. Groundwater flow within the Principal Aquifer is to the west-southwest. In the vicinity of the site, the Principal Aquifer is overlain by thin discontinuous perched groundwater lenses. These perched zones do not contain significant quantities of groundwater. Wells completed within the perched zones in the vicinity of the site are often dry.

2.4 Previous Investigations

Previous investigations have indicated the presence of solvents in the groundwater in the vicinity of the former Y-12 facility. In 1995, in conjunction with site closure and dismantling activities, NGC excavated impacted soil in areas of concern at the site. As part of the closure activities, the RWQCB requested NGC to collect groundwater samples across the site. Groundwater samples were obtained from the uppermost water-bearing zone using a HydropunchTM in-situ depth-discrete groundwater sampling tool. Groundwater sample results indicated detectable concentrations of 1,1-dichloroethene

(1,1-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1,2-trichloroethane (1,1,2-TCA), TCE, and PCE.

To date, NGC has installed groundwater monitoring wells and conducted HydropunchTM groundwater sampling. In 1996, NGC installed four groundwater monitoring wells (NMW-1, NMW-2, NMW-3, and NMW-4) completed in the upper Principal Aquifer. These initial four monitoring wells were positioned to evaluate water quality upgradient and downgradient of former site operations. In 1998, NGC installed three on site monitoring wells (NMW-2A, NMW-3A, and NMW-5A) completed in the perched water-bearing zone overlying the upper Principal Aquifer, one on site monitoring well (NMW-5) completed in the upper Principal Aquifer, and two off-site monitoring wells one completed in the upper Principal Aquifer (NMW-7) and one in the perched water-bearing zone (NMW-7A). The placement and construction of these wells were designed to evaluate the vertical and lateral extent of dissolved VOCs in the groundwater in the vicinity of the site. In 2000, NGC installed two additional monitoring wells, one (NMW-8) completed in the upper Principal Aquifer and one (NMW-6) completed in the perched water-bearing zone to define the leading edge of the groundwater plume.

In 1998, a series of vertical HydropunchTM groundwater samples (H-2B) were collected at the west boundary of the site (Figure 2). Groundwater samples were collected at 10 foot intervals from 110 feet bgs to 190 feet bgs. The boring for this HydropunchTM location was advanced using a hollow-stem auger. At each sampling interval the HydropunchTM sampling tool was to be advanced vertically below the augers and collect the sample. The results of this sampling revealed low TCE concentrations (2 micrograms per liter [ug/L]) at the shallowest (110 feet bgs) depth interval and the greatest TCE concentration (209 ug/L) at the deepest sampling interval (190 feet bgs). The concentration profile observed at this location is opposite of what has been observed at other nearby wells completed at similar depths, where the TCE and other VOC concentrations decrease with depth. It is unknown whether there may have been a sampling error in the field and/or a laboratory error. The data previously reported is clearly inconsistent with the local vertical plume profile and more consistent with the results being reversed. In addition to these suspect results, during sample collection several problems were encountered which in themselves leave the data suspect. These problems included leaving the borehole open for several hours and in one case overnight leaving the borehole subject to cross contamination between zones and the addition of large volumes of water into the borehole from an undocumented source. Several issues occurred during this sampling that strongly suggest that the data generated from this HydropunchTM location is highly suspect and should not be used for VOC vertical plume delineation in the future.

3.0 METHODOLOGY

The objectives of this well installation program include: 1) to comply with the RWQCB request to acquire additional groundwater quality data to further refine the lateral and vertical extent of VOCs downgradient of the site; 2) to obtain additional plume characterization data to support conclusions that the bulk of VOC impacts observed in the vicinity of the site are from upgradient sources; and 3) to demonstrate to the RWQCB and OCWD that the results of this investigation are consistent with previous water quality findings in the area to support the recommendation that no additional characterization work is necessary. To accomplish these objectives, the scope of work included the installation of one well cluster consisting of three monitoring wells installed approximately 650 feet downgradient of the site at the intersection of National Street and Liberty Avenue (Figure 2).

This section of the report presents a summary of field procedures that were used to emplace and sample the new monitoring well cluster.

3.1 *Health and Safety Plan*

Prior to the commencement of the field program, the existing project health and safety plan (HASP) was reviewed and updated where necessary to reflect the current scope of work. At the beginning of the field program, and at the beginning of each day, a "tail gate" safety meeting was conducted where all project personnel (EEC and subcontractors) were briefed by the site safety officer on the potential chemical and physical hazards associated with the scope of work. A copy of the HASP was accessible to field personnel at all times during the program. All procedures outlined in the HASP were followed during the field program.

3.2 *Permits and Bonds*

Several permits, bonds, and licenses were required for constructing the monitoring well cluster within the public right-of-way. Some of these permits required long lead times resulting in some delays in conducting the program. The permits required for this project were obtained from the City of Anaheim and included; Well Permit, Bond Application, Encroachment License, and Right-of-Way Construction Permit. Copies of these permits are provided in Appendix A.

3.3 *Utility Clearance*

In accordance with California Code Section 4216-4216.9, underground services alert (USA) was notified at least 48 hours in advance of drilling to clear underground utilities. Additionally, a geophysical survey was performed in the area of the proposed well to clear any undocumented utilities.

3.4 Soil Boring

Water Development Corporation of Montclair, California was selected as the drilling subcontractor for this project based on the proposed drilling methods, local experience, and availability to meet the project schedule. The drilling portion of this project was conducted on December 17 and 18, 2001.

The upper 15 feet of the boring was advanced using 16-inch diameter air rotary-casing hammer (ARCH) drive casing. The drive casing was used to stabilize the upper portion of the borehole to enable the advancement of a 14.5-inch diameter borehole through the 16-inch diameter drive casing. The 14.5-inch diameter borehole was advanced from 15 feet bgs to the total depth of 207 feet bgs using the direct mud rotary drilling method.

The mud rotary drilling method is a fluid drilling approach that requires a supply of water to provide circulation. Water supply for the drilling operation was obtained from a City of Anaheim fire hydrant. Prior to use of this water, a sample was collected and analyzed for VOCs by EPA Method 8260B. Constituents of concern consisting of PCE, TCE, and 1,1,1-trichloroethane (1,1,1-TCA) and breakdown products were not detected. Some compounds associated with the City's chlorination process were detected at low concentrations.

Drill cutting samples were collected at 5-foot intervals and logged according to the United Soil Classification System (USCS) under the supervision of a California Registered Geologist. Samples were collected prior to discharge onto the shaker table, where some of the fine-grained sediments are lost. Samples obtained prior to the shaker table results in the collection of the most representative samples by this drilling method. A copy of the soil boring log is provided in Appendix B.

3.5 Geophysical Logging

On December 18, 2001, upon reaching the total drill depth of 207 feet bgs, a suite of downhole geophysical logs consisting of resistivity (long, short, and guard), spontaneous potential, and natural gamma were run within the open borehole. Due to the nature of the mud rotary drilling method, sample quality for logging purposes (e.g. knowledge of sample depth, depths of lithologic contacts, and percentage of fine and coarse-grained material) is somewhat suspect.

The various geophysical logs provide detailed in-situ lithologic data to enable effective well design. Because significant lithologic data previously had been obtained from the site, a preliminary well design was prepared and submitted as part of the well installation work plan. Geophysical logs were run to confirm the appropriateness of the preliminary design and to make any changes if the subsurface conditions warranted a change.

The formation materials encountered within this boring were similar to previous borings advanced in the vicinity and was consistent with the preliminary well design. Thus, there

was no significant field modifications to the preliminary well design provided in the August 16, 2001 Work Plan.

In addition to the geophysical logs, a caliper log was run in the open borehole to measure the borehole diameter. The caliper log indicates if there are any wash out zones and/or swelling clays within the borehole that would require special consideration during well construction. The results of the caliper log revealed that the borehole diameter remained fairly constant from surface to total depth with no significant areas of concern that would require corrective action. A copy of the caliper log is provided in Appendix C.

3.6 Well Installation

Upon completion and review of the geophysical logs, the monitoring well cluster was constructed. Construction of the well cluster was performed on December 18 and 19, 2001. Three monitoring wells were built within the same boring to monitor three depth intervals within the subsurface. The deepest of the three wells in the cluster (NMW-9) was constructed of 4-inch diameter Schedule 80 polyvinyl chloride (PVC) completed with 0.020-inch slotted stainless steel screen between 190 and 200 feet bgs. The deepest well was designed to monitor the middle to deeper portion of the upper Principal Aquifer. The well also provides a monitor point for comparison with other similarly screened wells within the area. Stainless steel well screen was selected for corrosion resistance, strength, and durability. The screen slot size of 0.020-inch diameter was selected based on the formation materials encountered during drilling and consistency with surrounding monitoring wells. A construction diagram of the completed well cluster is provided on Figure 3.

The mid-depth well (NMW-9A) within the well cluster was designed to monitor water quality in the upper Principal Aquifer. It provides a consistent monitoring point interval for local and regional monitoring wells completed in the same interval. NMW-9A was constructed of 4-inch diameter Schedule 80 PVC and completed with 0.020-inch slotted stainless steel screen between 110 and 120 feet bgs (Figure 3).

The shallowest well within the cluster (NMW-9B) was designed to monitor the sometime saturated discontinuous perched groundwater zone. NMW-9B was constructed of 2-inch diameter Schedule 40 PVC completed with 0.020-inch slotted stainless steel screen between 80 and 90 feet bgs (Figure 3). This well within the cluster was installed at the request of the RWQCB and was proposed as an optional task within the August 16, 2001 Work Plan. During drilling and subsequent geophysical logging, there was no indication that the perched zone existed in the area of the well cluster. However, because the RWQCB requested this zone to be monitored and the request could be accomplished with minimal effort and expense at the time of well cluster installation, the shallow (NMW-9B) zone well was constructed. Upon completion, the shallow perched interval (NMW-9B) was not within a saturated interval. If water levels change in the future and/or if this interval becomes saturated, this zone (NMW-9B) may be sampled to provide additional perched zone water quality data.

The filter pack for each monitoring well within the cluster was constructed with No. 2/12 Monterey Sand. The filter pack for each well was extended approximately 5 feet above the screen-intervals. Each filter pack zone was isolated from the others using a bentonite seal (Figure 3). The upper portion of the annular space from 70 feet to approximately 1-foot bgs was completed using a cement/bentonite grout (VolclayTM). The top of the well cluster was completed in a watertight traffic-rated well box.

3.7 Well Development

Monitoring wells NMW-9 (lower to mid upper Principal Aquifer) and NMW-9A (upper Principal Aquifer) were developed between December 27, 2001 and January 4, 2002. Monitoring well NMW-9B was not developed because the well did not contain water at the time of development. The purpose of well development is to remove solids that entered the well during well construction, improve hydraulic communication between the formation and the well, and improve the quality of water samples that would be subsequently collected from the well.

Well development methods included bailing, swabbing, and pumping techniques to sufficiently agitate water within the well to release fine-grained material from the formation and allow the material to enter the well where it is removed to improve well performance. To evaluate effectiveness of well development and to determine when development was complete, water quality field measurements consisting of pH, temperature, conductivity, and turbidity were collected. Well development continued until three consecutive turbidity readings were less than or equal to 5 nephelometer turbidity units (NTU) and three consecutive measurements of pH, temperature, and conductivity were relatively constant (e.g. within 10 percent of previous readings).

3.8 Groundwater Sampling

Groundwater samples were collected from NMW-9 and NMW-9A on January 3, 2002 and January 4, 2002, respectively following well development. The samples were collected through a valve on the wellhead that was connected to the pump and tremmie pipe assembly. Upon collection, the samples were placed in a cooler chilled with ice and submitted under proper chain-of-custody documentation to the project laboratories for analysis. Associated Laboratories of Orange, California analyzed the collected samples for VOCs by EPA Method 8260B. APPL Laboratories of Fresno, California analyzed collected water samples for 1,4-dioxane by EPA Method 8270C. A summary of the groundwater analytical from NMW-9 and NMW-9A are provided on Table 1. Laboratory data sheets and chain-of-custody documentation is provided in Appendix D.

3.9 *Waste Management*

Investigation-derived waste consisting of drilling mud, drill cuttings, and groundwater were contained in six 20-yard roll-off bins. Soil and groundwater waste profile samples were collected from the roll-off bins and analyzed for VOCs by EPA Method 8260B, total petroleum hydrocarbons (TPH) by EPA Method 8015 Modified. The profile waste analytical results are provided in Appendix E. Based on the profile results, the waste was transported to U.S. Filter Recovery Services in Vernon, California for disposal.

3.10 *Well Survey*

On February 14, 2002, ground surface, measuring point elevations, longitude and latitude coordinates for each monitoring well within the well cluster and all other NGC wells were surveyed to a known benchmark by William Teipe and Associates of Anaheim, California. Elevation measurements were referenced to mean sea level (msl) and surveyed to an accuracy of 0.01 foot. The longitude and latitude coordinates were surveyed to an accuracy of 0.648 meters. The well survey data is summarized on Table 2.

3.11 *Water Level Elevations*

In order to have a uniform groundwater elevation data set, on February 19, 2002 a round of groundwater level measurements were collected from all on- and off-site monitoring wells in the vicinity of the site. The wells with their respective groundwater elevations are presented in Table 3. Data collected from this gauging event were used to calculate the groundwater elevation, the direction of groundwater flow, and the hydraulic gradient. A potentiometric surface map for the February 19, 2002 gauging event is provided on Figure 4.

4.0 WELL INVESTIGATION FINDINGS

This section of the report presents a summary of the significant findings of the well installation and groundwater monitoring program. Later, in Section 5.0, the findings derived from this investigation are compared to the regional conceptual hydrogeologic model in the vicinity of the Y-12 site.

4.1 Soil Boring

The soil encountered during drilling was consistent with previous work conducted in the area. Earth materials encountered during drilling consisted primarily of poorly-graded, fine- to medium-grained sand interbedded with silt and clay. Fine-grained material consisting of primarily clay was encountered between approximately 93 and 106 feet bgs. This depth interval is consistent with the regional aquitard overlying the upper Principal Aquifer. The formation materials that encompass the upper Principal Aquifer primarily consist of poor to well graded sand.

4.2 Groundwater Elevation and Flow Direction

As mentioned above, a round of groundwater level measurements were collected on February 19, 2002. Groundwater elevations at monitoring wells and the groundwater flow direction and gradient were calculated. The depth to groundwater on February 19, 2002 at NMW-9 (mid to lower upper Principal Aquifer) and NMW-9A (upper Principal Aquifer) was 107.59 feet bgs (49.87 feet msl) and 107.65 feet bgs (49.88 feet above msl), respectively. This data indicates that there is no vertical gradient between the upper and lower portions of the upper Principal Aquifer. The direction of groundwater flow is to the southwest under a hydraulic gradient of 0.001. The direction of groundwater flow and gradient are consistent with previous monitoring events (Figure 4).

4.3 Groundwater Analytical Results

Tetrachloroethene (PCE) was detected below the reporting limit of 5.0 ug/L in both NMW-9 and NMW-9A at concentrations of 3.2 ug/L and 1.7 ug/L, respectively. In accordance with the EPA 8260B method procedures, the reporting limit of PCE is 5.0 ug/L, even though the method can detect the presence of PCE at lower concentrations. Thus, concentrations below the detection limit for reporting purposes (DLR) and greater than the minimum detection limit (MDL) are reported by the laboratory as "J" values. The laboratory reported the PCE concentration in NMW-9 and NMW-9A as "J" values, meaning that the constituent was detected below the method reporting limit.

Trichloroethene (TCE) was detected in NMW-9 at a concentration of 1.1 ug/L. Again, because this concentration was detected below the DLR of 5.0 ug/L, the laboratory reported this concentration as a "J" value. The sample collected from well NMW-9A (upper Principal Aquifer) contained TCE at a concentration of 86 ug/L. No other VOCs

were detected in NMW-9 or NMW-9A. A summary of the analytical results are presented on Table 1.

The compound 1,4-dioxane was detected in NMW-9 below the reporting limit of 1.0 ug/L at a concentration of 0.59 ug/L. The laboratory reported this concentration as a "J" value. In NMW-9A, 1,4-dioxane was detected at a concentration of 1.5 ug/L (Table 1).

5.0 REGIONAL PLUME PERSPECTIVE

The results of this investigation were evaluated with respect to the regional groundwater plume and conceptual hydrogeologic model of the area. With the findings of this investigation, coupled with recent water quality data from surrounding wells, updated TCE and PCE isoconcentration depictions of the regional plume in the vicinity of the site using data from similarly screened monitoring wells were generated. One of the objectives of this evaluation, is to determine if the TCE and PCE detections observed in NMW-9 and NMW-9A are indicative of a site source or are these data more consistent with a regional plume migrating beneath and downgradient of the site. A summary of this evaluation is presented below.

5.1 *Shallow Zone of Upper Principal Aquifer*

The upper Principal Aquifer within the region of the site appears to be fairly homogenous without a significant fine-grained unit separating the upper from the lower intervals. However, a significant vertical TCE and PCE concentration gradient exists between the shallow and lower zones of the upper Principal Aquifer. For the purposes of this evaluation, the upper Principal Aquifer is defined as wells screened in zone below the aquitard (approximately 100 feet bgs to a depth of approximately 165 feet bgs). A discussion of the TCE and PCE concentrations is discussed below.

5.1.1 TCE

An isoconcentration depiction of TCE data obtained from wells screened in the upper Principal Aquifer is presented in Figure 5. A summary of the data set used for this depiction is provided on Table 4.

The groundwater TCE concentration map (Figure 5) shows a regional groundwater plume extending up and downgradient of the former Y-12 facility. TCE concentrations in the shallow zone of the upper Principal Aquifer upgradient of the site range from 15.3 (FM-12A) to 151 ug/L (NMW-3) and TCE concentrations downgradient of the site range between from 16 ug/L (NMW-5) to 125 ug/L (NMW-2). Also depicted on Figure 5, is a large TCE mass with concentrations exceeding 100 ug/L emanating from an upgradient source that is now underlying the site. The similar TCE concentrations upgradient and downgradient of the site are consistent with a regional TCE plume migrating across the site. These data also suggest that the site is not a significant source, if any, to the regional TCE plume.

5.1.2 PCE

The updated regional PCE plume is presented on Figure 6. PCE data used is summarized on Table 4. The regional PCE groundwater plume extends both up and downgradient of the site. PCE concentrations immediately upgradient of the site range from 3.2 ug/L (NMW-4) to 35.4 ug/L (FM-5) and downgradient PCE concentrations range from 1.7 ug/L (NMW-9A) to 35 ug/L (NMW-2). PCE concentrations downgradient of the site are

consistent with upgradient PCE concentrations indicating that PCE concentrations downgradient of the site are a function of the regional PCE migrating beneath the site. The data also indicates that the site is not a significant source, if any, to the regional PCE plume.

5.2 Middle to Lower Zone of Upper Principal Aquifer

For the purposes of this evaluation, the wells used to evaluate the TCE and PCE concentrations in the middle to lower zones of the upper Principal Aquifer are wells screened between approximately 150 feet bgs to 238 feet bgs. A discussion of the TCE and PCE distribution within this depth interval is discussed below.

5.2.1 TCE

An isoconcentration depiction of TCE data obtained from wells screened in the middle to lower zones of the upper Principal Aquifer is presented in Figure 7. The analytical data set used for this depiction is presented on Table 5.

The regional TCE plume in the middle to lower zones of the upper Principal Aquifer extends both upgradient and downgradient of the site (Figure 7). TCE concentrations upgradient of the site range from 14.2 ug/L (FM-10) to 33.1 ug/L (FM-10A) and downgradient TCE concentrations range from 1.1 ug/L (NMW-9) to 9.8 ug/L (AM-41A). These data indicate that TCE concentrations in the middle to lower zones of the upper Principal Aquifer are lower downgradient of the site. These data also reveal the presence of an elongated lobe of TCE-impacted groundwater located approximately 2,000 feet south and extending further west than the site. This indicates that TCE has migrated along a different flow path, than TCE detected in the vicinity of the site, greater distances than the site, from upgradient sources, providing further evidence that the bulk of TCE on site and downgradient of the site are primarily from upgradient sources.

5.2.2 PCE

The updated regional PCE plume for the middle to lower zones of the upper Principal Aquifer is presented on Figure 8 with data shown on Table 5. The regional PCE data in the middle to lower zones of the upper Principal Aquifer reveals a groundwater plume extending both up and downgradient of the site. PCE concentrations in the middle to lower zones of the upper Principal Aquifer upgradient of the site range from 2.2 ug/L (FM-10) to 12 ug/L (AM-39) and downgradient concentrations range from 1.7 ug/L (NMW-9) to 25.5 ug/L (AM-41A). The distribution of PCE in the middle to lower zones of the upper Principal Aquifer south and downgradient of the site reveals PCE at a concentration of 16.7 ug/L (FM-7). Again, PCE at this location documents that PCE has traveled greater distances than the site from upgradient sources. The PCE concentrations observed at the site and downgradient of the site are consistent with upgradient sources.

PCE was detected in one downgradient monitoring well at a concentration of 25.5 ug/L (AM-41A). This concentration is somewhat greater than upgradient PCE concentrations. For a middle to upper Principal Aquifer well, well AM-41A is screened relatively

shallow (156 to 166 feet bgs) compared with the other middle to deep upper Principal Aquifer wells (screened between 150 and 238 feet bgs) and the PCE concentration observed in AM-41A is consistent with the shallow zone of the upper Principal Aquifer. PCE concentration of 22 ug/L observed in the adjacent well NMW-7 which is lower than upgradient PCE concentrations.

5.3 *Upper Principal Aquifer Composite*

In addition to evaluating the TCE and PCE distribution in the upper Principal Aquifer as upper and lower zones, composite TCE and PCE depictions of the regional plume in the vicinity of the site were prepared and compared with the plume depictions prepared by the OCWD in 2000. A summary of TCE and PCE observations are presented below.

5.3.1 TCE

The composite TCE distribution depiction for wells screened between 100 and 238 feet bgs in the upper to lower zones of the upper Principal Aquifer is presented on Figure 9. Compared with the regional plume depiction prepared by the OCWD in 2000 (Figure 10), these data indicate that the regional TCE plume extends further north due to the detection of TCE at FM-8 (56.9 ug/L) and further south due to the detection at STEP-A (5.9 ug/L). Previously TCE, was not detected in FM-8 or STEP-A. Additionally, the TCE plume appears to have migrated further west as observed by the increasing TCE concentration in well FM-11A. With these noted exceptions, the composite TCE concentration map shown on Figure 9, is consistent with the TCE depiction prepared by OCWD in 2000, shown as Figure 10.

5.3.2 PCE

The composite PCE distribution depiction for the upper to lower zones of the upper Principal Aquifer which includes wells screened within the 100 to 238 feet bgs interval is presented on Figure 11. These data indicate that the regional PCE plume extends further north due to the PCE detection at FM-8 (35.4 ug/L) than previous plume depictions by OCWD where PCE at FM-8 was not detected. The regional PCE plume depiction prepared by the OCWD shown as Figure 12 indicates a zone of non detectable PCE immediately upgradient of the Y-12 site. As been shown by in this analysis, significant data exists to suggest that the regional plume is continuous from upgradient sources to the site and continues downgradient of the site.

6.0 CONCLUSIONS

Based on the findings of this well installation and in light of the regional plume perspective the following conclusions can be made:

- The TCE and PCE concentrations observed in both the newly installed well cluster (NMW-9 and NMW-9A) and other nearby wells downgradient of the site are consistent with and typically lower than the TCE and PCE concentrations observed upgradient of the site.
- The TCE and PCE groundwater plume from upgradient sources has migrated beneath and past the site.
- An elongated extension of TCE-impacted groundwater located approximately 2000 feet south of the site indicates that contaminants have traveled greater distances than the site, from upgradient sources, providing further evidence that the bulk of the VOCs on site and downgradient of the site are from upgradient sources.
- The site does not appear to be a significant source to the regional TCE and PCE groundwater plume.
- All lateral and vertical plume delineation objectives of the RWQCB and OCWD have been satisfied during this investigation, thus no further investigation or characterization is warranted.

TABLES

TABLE 1

Summary of Groundwater Analytical Results

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Well	Screen Interval (feet bgs)	Detected Compound					
		TCE		PCE		4-Dioxane	
		Result (ug/L)	Detection Limit (ug/L)	Result (ug/L)	Detection Limit (ug/L)	Result (ug/L)	Detection Limit (ug/L)
NMW-9	190 to 200	1.1 J	5.0	3.2 J	5.0	0.59 J	1.0
NMW-9A	110 to 120	86	5.0	1.7 J	5.0	1.5	1.0
NMW-9B	80 to 90	NS	NS	NS	NS	NS	NS

Explanation:

NS = Not sampled

J = Compound detected between reporting limit and method detection limit

ug/L = Micrograms per liter

bgs = Below ground surface

 NGSC-RWQCB012226

TABLE 2**Summary of Well Survey Data**

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Well	Latitude	Longitude	Elevation Top of Casing (feet msl)
NMW -1	33.86095	-117.915462	160.64
NMW -2	33.860732	-117.915461	161.05
NMW -2A	33.860754	-117.915462	161.41
NMW -3	33.862244	-117.914514	159.65
NMW -3A	33.862218	-117.914514	159.83
NMW -4	33.860239	-117.914491	162.17
NMW -5	33.860199	-117.915467	161.78
NMW -5A	33.860226	-117.915466	161.64
NMW -6	33.859844	-117.917833	161.41
NMW -7	33.860991	-117.916312	157.69
NMW -7A	33.861008	-117.916282	157.82
NMW -8	33.859702	-117.917898	161.29
NMW-9	33.861114	-117.91762	157.46
NMW-9A	33.861114	-117.91762	157.53
NMW-9B	33.831114	-117.91762	157.47

Explanation:

msl = Mean sea level

TABLE 3

Summary of Groundwater Elevation Data

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Well	Date Measured	Water Level (ft bgs)	Well Casing Elevation (ft msl)	Water Level Elevation (ft msl)
AM-41*	2/1/02	NA	NA	56.45
AM-41A*	2/1/02	NA	NA	56.60
NMW-1	2/19/02	110.03	160.64	50.61
NMW-2	2/19/02	110.47	161.05	50.58
NMW-2A	2/19/02	89.59	161.41	71.82
NMW-3	2/19/02	108.59	159.65	51.06
NMW-3A	2/19/02	Dry	159.83	Dry
NMW-4	2/19/02	111.30	162.17	50.87
NMW-5	2/19/02	111.33	161.78	50.45
NMW-5A	2/19/02	93.59	161.64	68.05
NMW-6	2/19/02	70.90	161.41	90.51
NMW-7	2/19/02	107.40	157.69	50.29
NMW-7A	2/19/02	88.21	157.82	69.61
NMW-8	2/19/02	111.61	161.29	49.68
NMW-9	2/19/02	107.59	157.46	49.87
NMW-9A	2/19/02	107.65	157.53	49.88
NMW-9B	2/19/02	Dry	157.47	Dry

Explanation:

* = Measurements Collected by OCWD

NA = Not available

bgs = Below ground surface

msl = Mean sea level

TABLE 4**Summary of TCE and PCE Data
Upper Principal Aquifer**

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Well	Screen Interval (feet bgs)	Latest Sample Date	TCE Concentration (ug/L)	PCE Concentration (ug/L)
FM-5	121 to 141	7/9/01	123	20.6
FM-8	114 to 134	5/10/01	56.9	35.4
FM-11A	134 to 154	4/10/01	45.6	1.8
FM-12A	135 to 155	5/10/01	15.3	3.0
FM-15A	120 to 140	5/29/01	109	ND
NMW-1	110 to 125	12/19/01	47	14
NMW-2	110 to 125	12/19/01	125	35
NMW-3	112 to 127	12/19/01	151	2.5
NMW-4	110 to 125	12/19/01	19	3.2
NMW-5	110 to 125	12/19/01	16	2.7
NMW-7	109 to 124	12/19/01	63	22
NMW-8	97 to 122	12/19/01	1.6	ND
NMW-9A	110 to 120	1/4/02	86	1.7 J
AM-39A	115 to 135	5/19/01	9.2	2.3
AM-42A	115 to 130	5/12/01	10.7	56.2
AM-40A	145 to 165	5/12/01	6.6	7.2

Explanation:

ND = Not detected

J = Compound detected between reporting limit and method detection limit

ug/L = Micrograms per liter

bgs = Below ground surface

Upper Principal Aquifer Wells = Top of screen between 100 and 150 feet bgs

TABLE 5**Summary of TCE and PCE Data
Lower Principal Aquifer**

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

Well	Screen Interval (feet bgs)	Latest Sample Date	TCE Concentration (ug/L)	PCE Concentration (ug/L)
FM-1A	164 to 172	8/30/01	8.6	6.7
FM-2A	226 to 234	8/21/01	0.9	6.4
FM-10	215 to 235	5/24/01	14.2	2.2
FM-10A	151 to 171	5/24/01	33.1	6.8
FM-12	206 to 226	5/10/01	ND	ND
FM-15	218 to 238	5/29/01	1.1	ND
AM-18A	208 to 215	10/17/01	0.6	ND
AM-39	168 to 188	5/19/01	1.7	12.0
AM-40	175 to 190	5/12/01	7.9	10.1
AM-41	190 to 200	4/18/01	2.2	2.3
AM-41A	156 to 166	4/18/01	9.8	25.5
AM-42	180 to 190	8/6/01	9.2	10.0
NMW-9	190 to 200	1/3/02	1.1 J	1.7 J
FM-7	152 to 187	11/30/00	17.8	16.7
FM-7A	153 to 160	11/30/01	9.7	7.6
STEP-A	163 to 210	8/30/01	5.9	ND

Explanation:

ND = Not detected

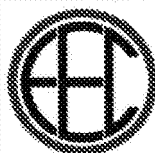
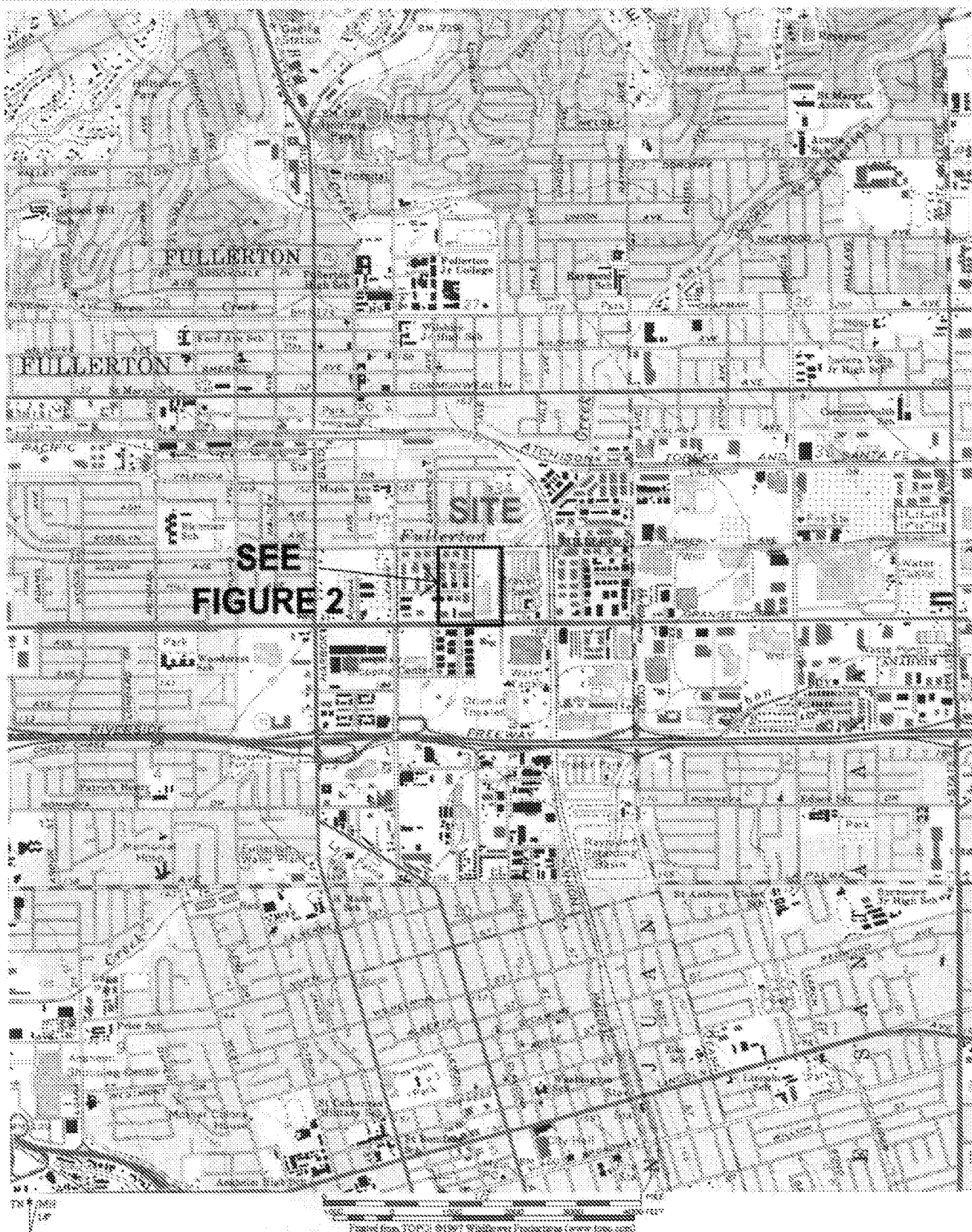
J = Compound detected between reporting limit and method detection limit

ug/L = Micrograms per liter

bgs = Below ground surface

Lower Principal Aquifer Wells = Top of screen greater than 150 feet bgs

FIGURES



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

Map Source: U.S.G.S. 7.5-minute
topographic quadrangle map
Anaheim, CA 1985
photorevised 1981

SITE LOCATION

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

File: S4870001

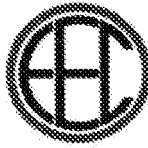
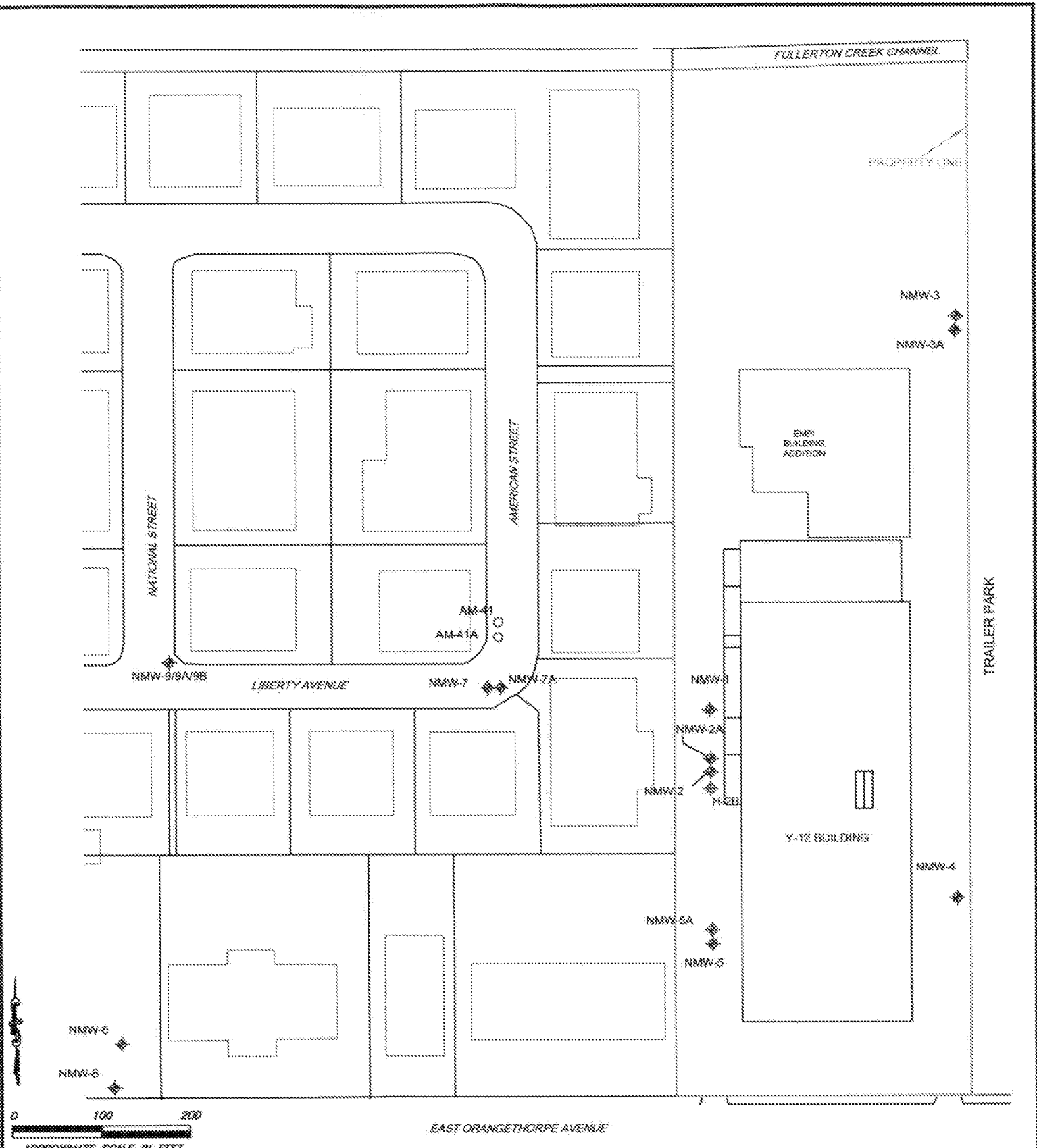
Date: 11/15/01

PM:
NTZ

R.G./P.E.:
MTZ

PROJECT NO.: S487-5

FIGURE:
1



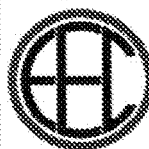
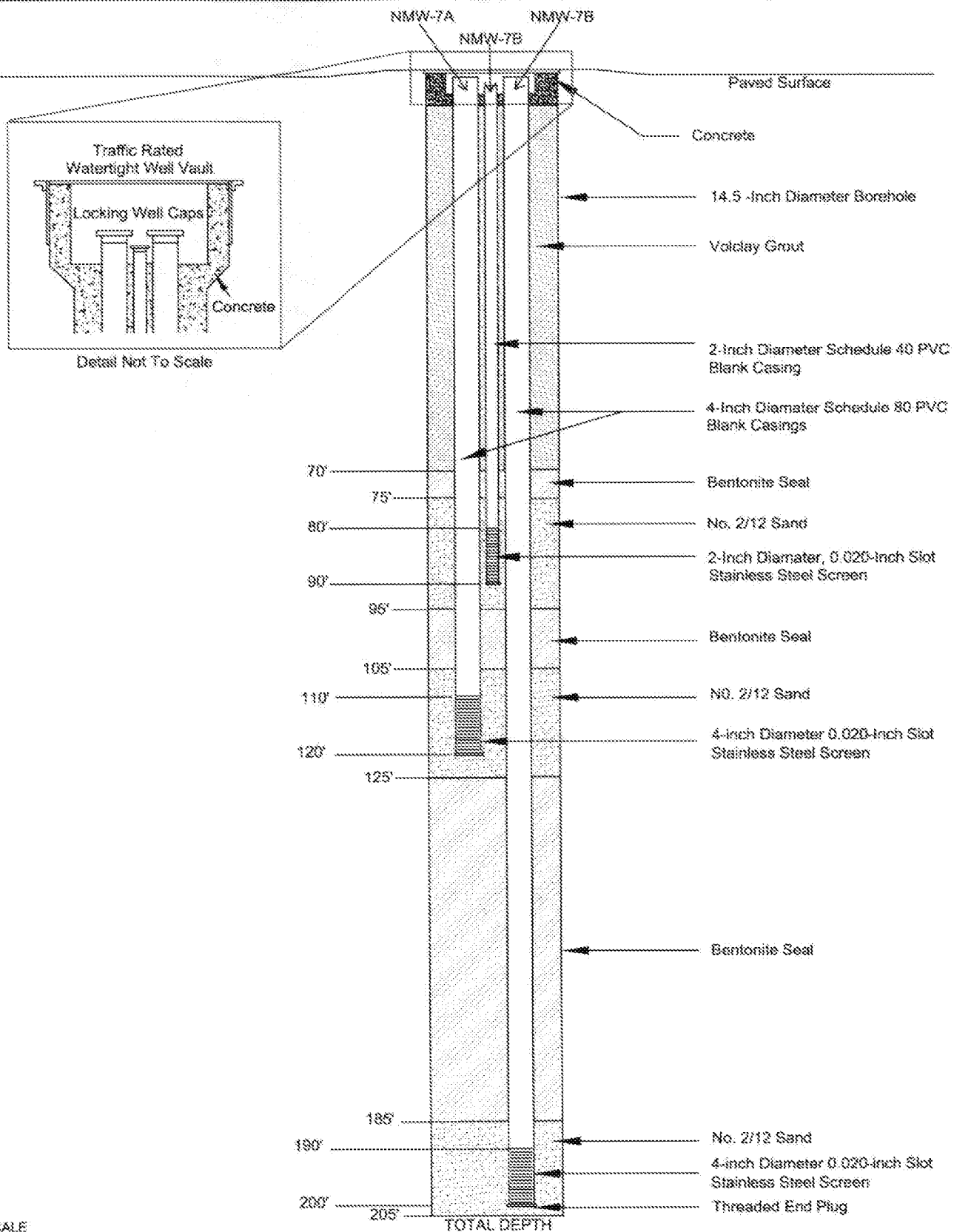
ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

- LEGEND:**
- NORTHROP MONITORING WELL
 - OTHER MONITORING WELL
 - HYDROPLUGH SAMPLING LOCATION

SITE VICINITY

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

File: S4870802[L1]	Date: 2/13/02	PM: MTZ	R.G./P.E.: MTZ	PROJECT NO.: S487-8/2	FIGURE: 2
-----------------------	------------------	------------	-------------------	--------------------------	---------------------



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

NOTE: Scale Approximate
All Depths Reported in Feet Below Ground Surface

MONITORING WELL CLUSTER CONSTRUCTION DETAILS

Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

File:
S487-3-MWdiag

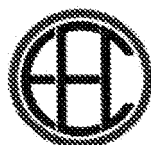
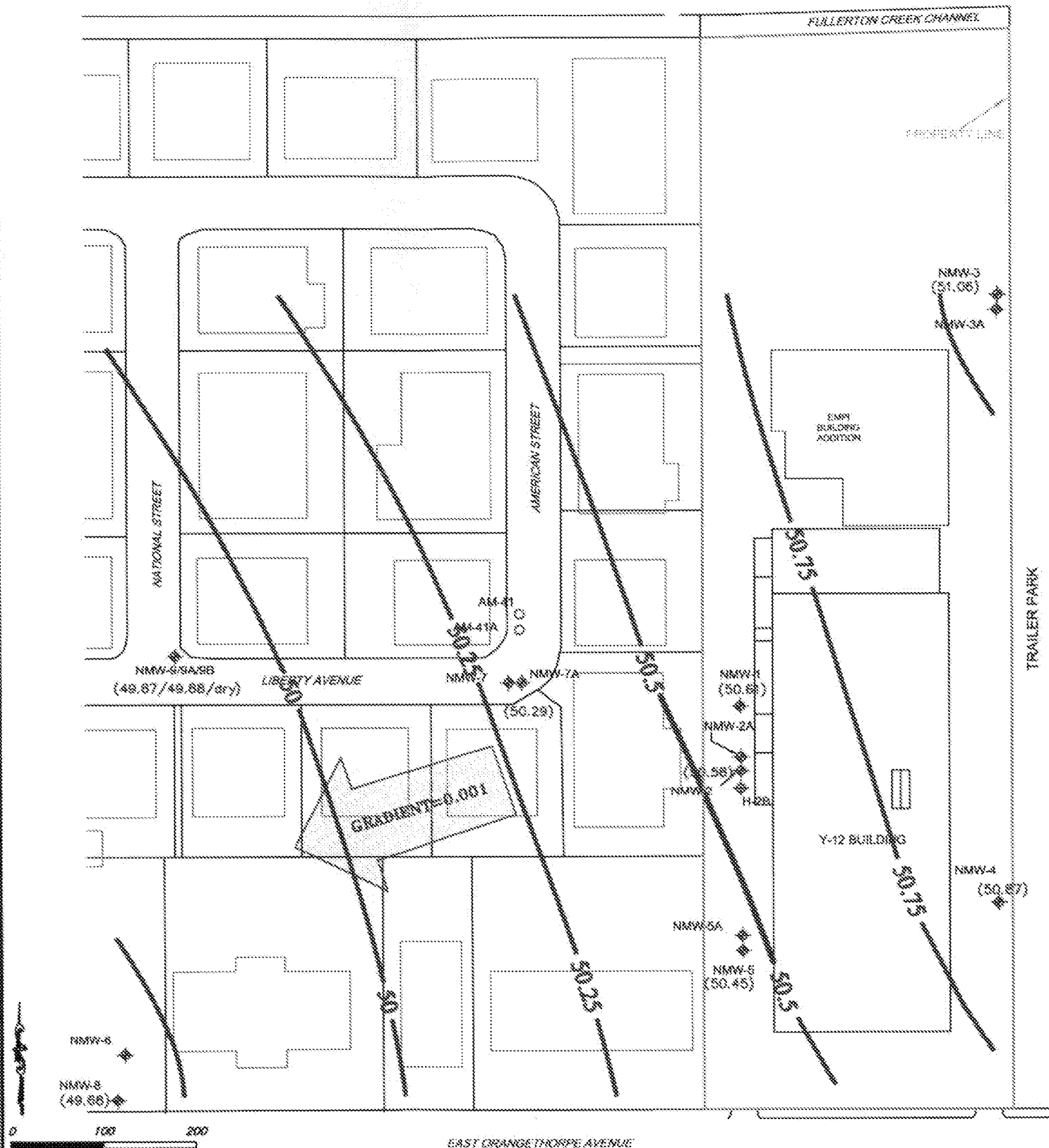
Date:
2/13/02

PM:
MTZ

R.G./P.E.
MTZ

PROJECT NO.
S487-8/2

FIGURE
3



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

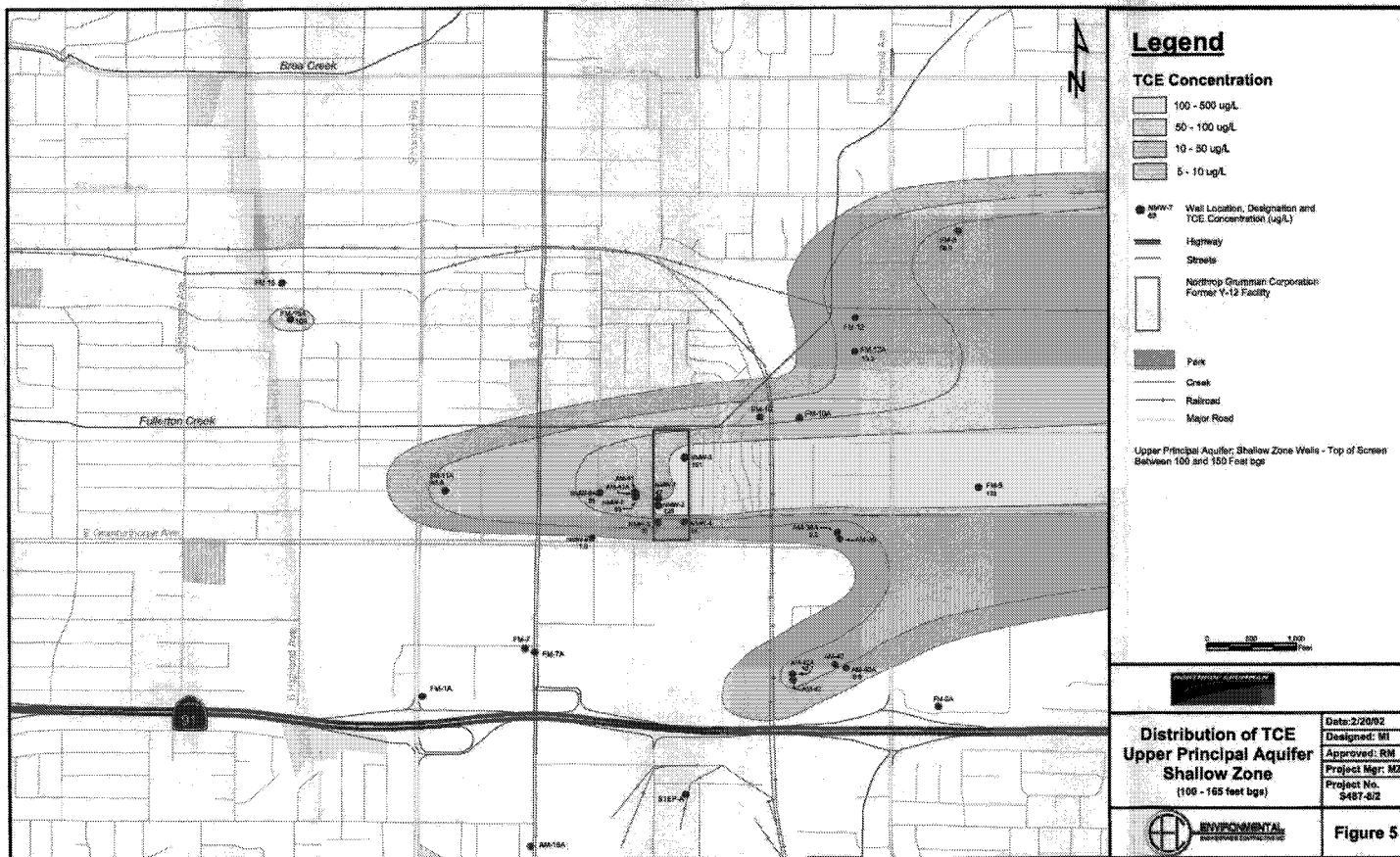
LEGEND:

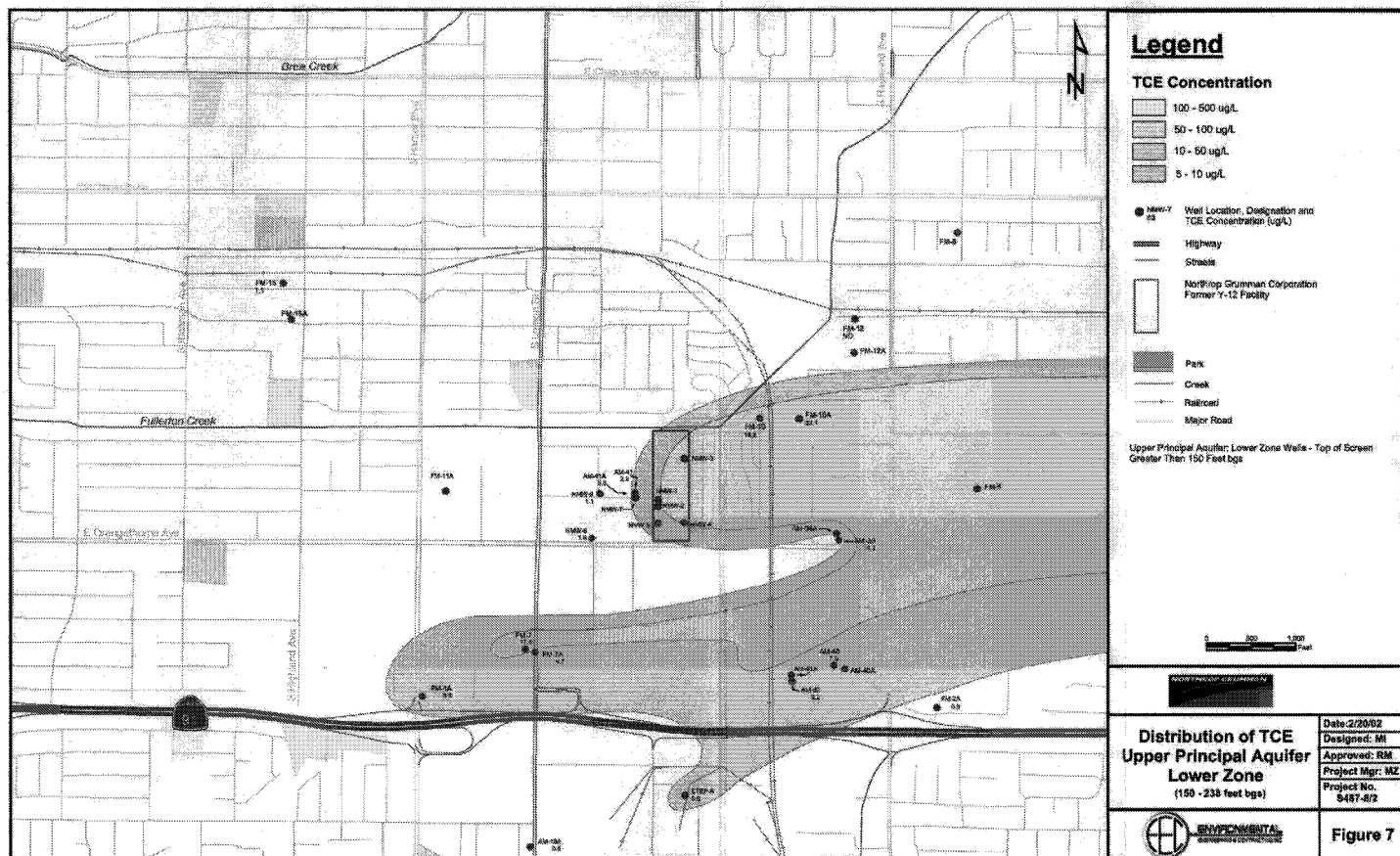
- NMW-6 NORTHROP MONITORING WELL
- NMW-8 NORTHROP MONITORING WELL
- H-2B HYDRO PUNCH SAMPLING LOCATION
- Line LINE OF EQUAL GROUNDWATER ELEVATION

POTENTIOMETRIC SURFACE
February 19, 2002

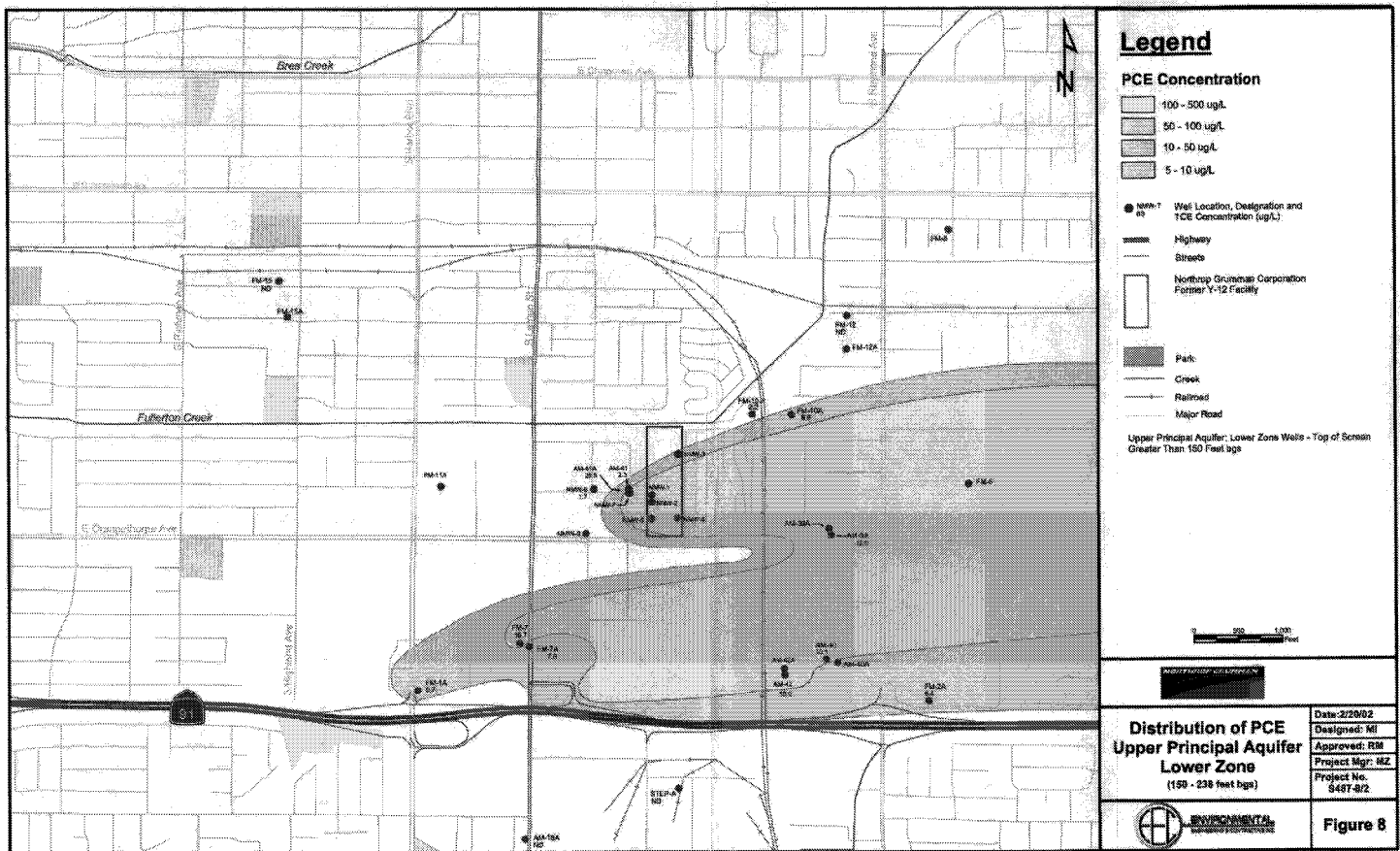
Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

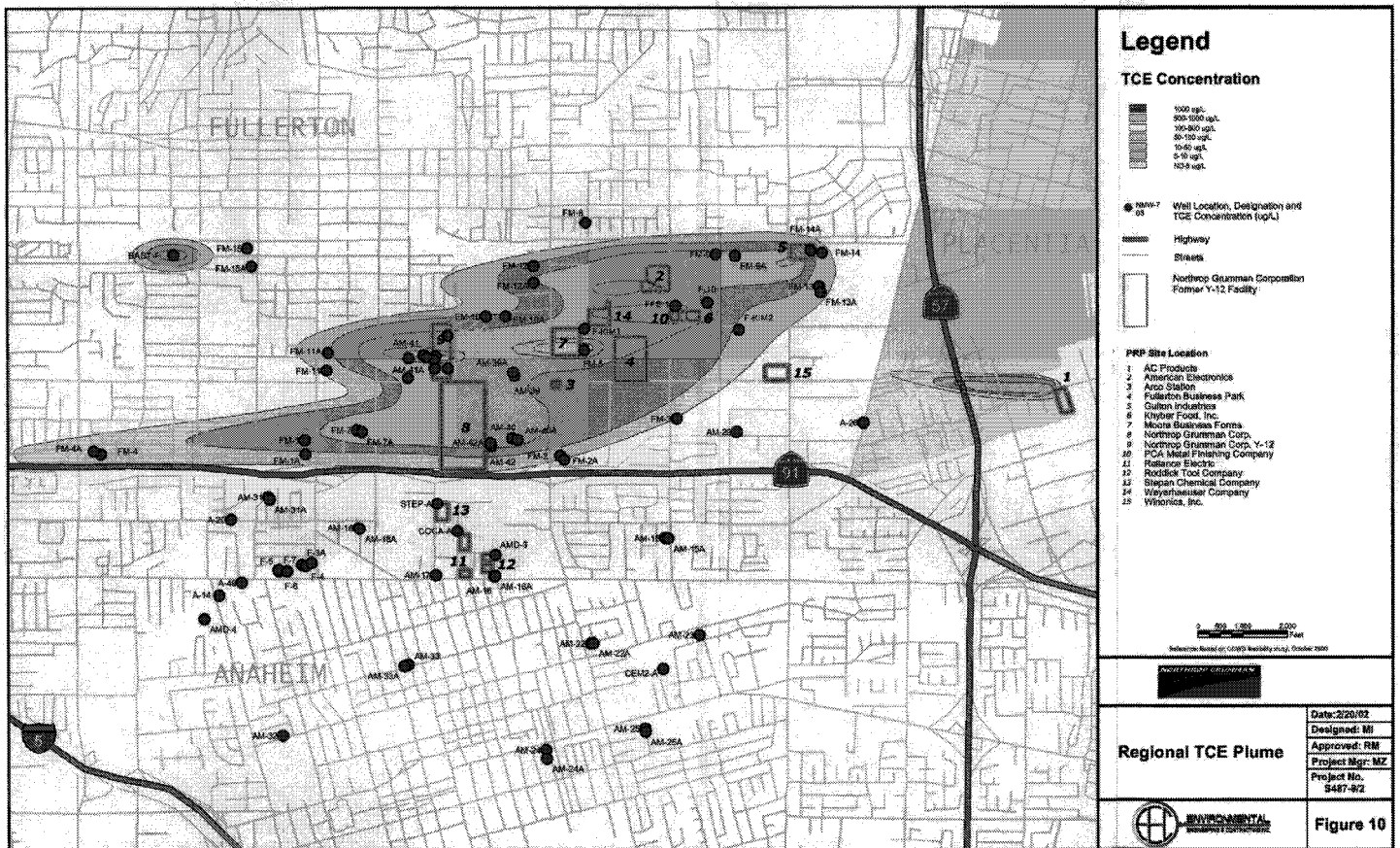
File:	Date:	PM:	R.G./P.E.:	PROJECT NO.:	FIGURE:
S4870802[L2]	2/13/02	MTZ	MTZ	S487-8/2	4



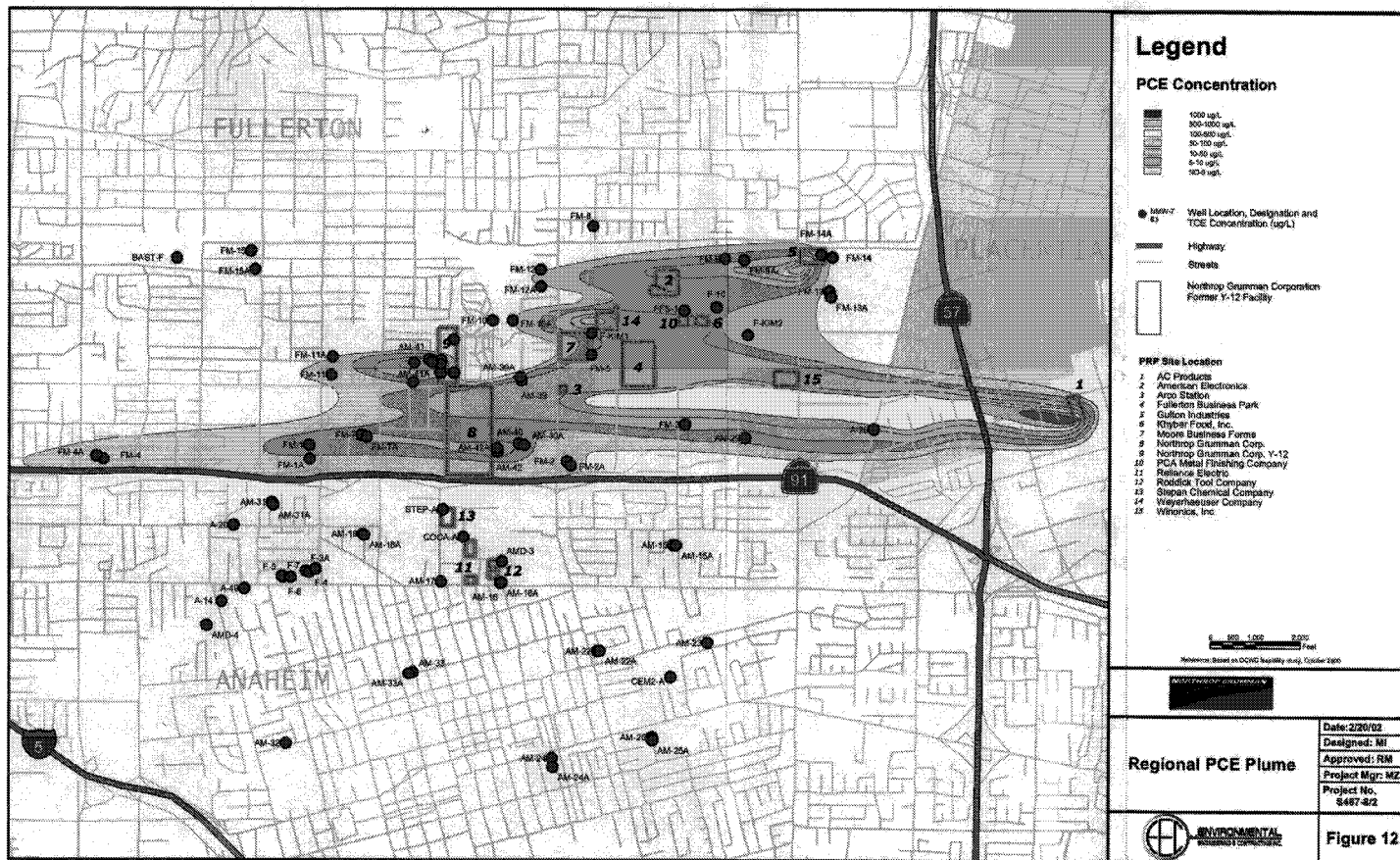


NGSC-RWQCB012238





NGSC-RWQCB012241



APPENDIX A
Permits

COLLECTION OFFICERS RECEIPT FOR WELL CONSTRUCTION OR DESTRUCTION PERMIT

Date 21 Nov 1970

APPLICANT'S NAME JOAN TILLY NAME OF FIRM LC WINDYBELL INC.
 STREET ADDRESS 115 N. CALIFORNIA AVE. SALT LAKE CITY CITY SALT LAKE CITY
 ZIP 84111 (TELEPHONE (801) 467-1800)

NAME OF OWNER City of Austin, TX ADDRESS 700 W. 10th St.
CITY Austin, TX STATE TX ZIP _____ PHONE () _____
LOCATION OF WELL _____ DIST. NO. _____
TYPE OF WELL _____ WELL NO. (If Known) _____ STATE _____ O.C.W.D. _____

DIAGRAM OF WELL SITE

2

Journal of Interpersonal Violence 28(10)

WATER ENGINEERING INSPECTION MUST BE SCHEDULED 48 HRS. PRIOR TO STARTING WORK AT (714) 254-5268.

METHOD OF CONSTRUCTION OR DESTRUCTION:

☐ WELL SHALL BE DESTROYED PER STANDARD DRAWING NO. W-630

☒ WELL TO BE DRILLED PER ATTACHED APPROVED PLANS

☐ OTHER

Type of Permit:

☐ DESTRUCTION

NEW CONSTRUCTION

☐ RECONSTRUCTION

PERMIT FEE \$ 10.00

I hereby agree to comply with all ordinances, rules and regulations of the City of Anaheim pertaining to well construction, reconstruction or destruction.

PERMIT ISSUED BY

SIGNED

DATE _____

INSPECTED BY

DATE _____

FUND DISTRIBUTION

FUND	AGV	ORG	REV SRCE	W.O.

DISTRIBUTION:
WHITE - APPLICANT
GREEN - WATER DIVISION
CANARY - ACCOUNTING
PINK - INSPECTOR
GOLDENROD - COLLECTIONS

WELL
PERMIT NO. 0791

Bond No. 26-67-62
Premium \$ 100.00

PERFORMANCE BOND

ALL MEN BY THESE PRESENTS: WHEREAS, Northrop Grumman Corporation, as PRINCIPAL, has applied to the City of Anaheim (hereinafter, "City") for an Encroachment License ENC2001-00021 (hereinafter, "License") to install certain facilities within the City right-of-way and

WHEREAS, said License requires Principal to execute and deliver to the City of Anaheim a bond for the faithful performance of following work and

WHEREAS, the Principal has agreed to do and perform the following work, the cost of which has been estimated by the Utilities Director of the City of Anaheim to be the sum of \$10,000.00:

For the installation of one cluster monitoring well and the subsequent abandonment (destruction and closure) thereof, according to City standards and specifications, including the repair of any public improvements damaged as the result of the installation and/or abandonment of said groundwater monitoring wells

all of which work shall be done and performed in accordance with plans and specifications which shall be approved by the Director of Public Utilities and/or Director of Public Works of the city of Anaheim, and all of which work shall be done at the sole expense of the Principal.

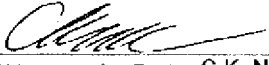
NOW, THEREFORE, we, Northrop Grumman Corporation, as Principal, and American Home Assurance Company, a Corporation organized and existing under the laws of the State of New York and duly authorized to transact a surety business in the State of California, as Surety, are held and firmly bound unto the City of Anaheim in the sum of TEN THOUSAND DOLLARS AND NO CENTS, (\$10,000.00) lawful money of the United States for the payment of which sum well and truly to be made, Principal and Surety bind themselves, their heirs, successors, executors and administrators, jointly and severally, firmly by these presents.

The Principal shall faithfully perform the work on his part, and shall fully indemnify and save harmless the City of Anaheim from all cost and damage which it may suffer by reason of failure to do so, and shall fully reimburse and repay the City of Anaheim all outlay and expense which the City of Anaheim may incur in making good any such default, then this obligation shall be null and void; otherwise it shall remain in full force and effect. As part of the obligation secured hereby and in addition to the face amount specified, there shall be included costs and reasonable expenses and fees, including reasonable attorney's fees, incurred by the City in successfully enforcing such obligation, all to be taxed as costs and included in the judgment rendered.

The Surety hereby stipulates and agrees that no change, extension of time, alternation or addition to the terms of the agreement or to the work to be performed thereunder or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension of time, alternation or addition to the terms of the agreement or to the work or to the specifications.

IN WITNESS WHEREOF, the said Principal and said Surety have caused these presents to be duly signed and sealed this 23rd day of October, 2001.


American Home Assurance Company
Surety

By 
Attorney in Fact C.K. Nakamura

777 S. Figueroa St.
Los Angeles CA 90017
Surety Address

Northrop Grumman Corporation

Principal

By 
John H. Mullan
Title Corporate Vice President & Secretary

By _____
Title _____

1840 Century Park East
Los Angeles CA 90067
Principal Address

APPROVED AS TO FORM:

City Attorney

Date

NGSC-RWQCB012246

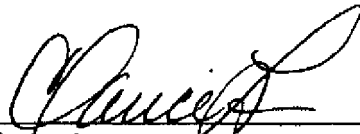
CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California

County of Los Angeles

On October 23, 2001 before me, Clarice Lee, Notary Public,
personally appeared C.K. Nakamura personally known to me (or
proved to me on the basis of satisfactory evidence) to be the person(s)
whose name(s) is/are subscribed to the within instrument and
acknowledged to me that he/she/they executed the same in his/her/their
authorized capacity(ies), and that by his/her/their signature(s) on the
instrument the person(s), or the entity upon behalf of which the person(s)
acted, executed the instrument.

WITNESS my hand and official seal.


Clarice Lee

American Home Assurance Company
National Union Fire Insurance Company of Pittsburgh, Pa.
Principal Bond Office: 70 Pine Street, New York, N.Y. 10270
KNOW ALL MEN BY THESE PRESENTS:

POWER OF ATTORNEY

No. 05-B-01233

That American Home Assurance Company, a New York corporation, and National Union Fire Insurance Company of Pittsburgh, Pa., a Pennsylvania corporation, does each hereby appoint

---Tracy Aston, Peter Arkley, C. K. Nakamura, E. S. Albrecht, Jr., Lisa L. Thornton,
William A. Sadler, Dennis T. Menard III, Maria Pena, Betty Walker, Tom Branigan,
Marina Tapia, Clarice Lee: of Los Angeles, California---

its true and lawful Attorney(s)-in-Fact, with full authority to execute on its behalf bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, issued in the course of its business, and to bind the respective company thereby.

IN WITNESS WHEREOF, American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. have each executed these presents



this 17th day of September, 2001.

Michael C. Fay
Michael C. Fay, Vice President

STATE OF NEW YORK }
COUNTY OF NEW YORK } ss.

On this 17th day of September, 2001 before me came the above named officer of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa., to me personally known to be the individual and officer described herein, and acknowledged that he executed the foregoing instrument and affixed the seals of said corporations thereto by authority of his office.

Dorothy L. Parker

DOROTHY L. PARKER
Notary Public, State of New York
No. 01PA60603
Qualified in Richmond County
Commission Expires June 25, 03

CERTIFICATE

Excerpts of Resolutions adopted by the Boards of Directors of American Home Assurance Company and National Union Fire Insurance Company of Pittsburgh, Pa. on May 18, 1976:

"RESOLVED, that the Chairman of the Board, the President, or any Vice President be, and hereby is, authorized to appoint Attorneys-in-Fact to represent and act for and on behalf of the Company to execute bonds, undertakings, recognizances and other contracts of indemnity and writings obligatory in the nature thereof, and to attach thereto the corporate seal of the Company, in the transaction of its surety business;

"RESOLVED, that the signatures and attestations of such officers and the seal of the Company may be affixed to any such Power of Attorney or to any certificate relating thereto by facsimile, and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company when so affixed with respect to any bond, undertaking, recognizance or other contract of indemnity or writing obligatory in the nature thereof;

"RESOLVED, that any such Attorney-in-Fact delivering a secretarial certification that the foregoing resolutions still be in effect may insert in such certification the date thereof, said date to be not later than the date of delivery thereof by such Attorney-in-Fact."

I, Elizabeth M. Tuck, Secretary of American Home Assurance Company and of National Union Fire Insurance Company of Pittsburgh, Pa. do hereby certify that the foregoing excerpts of Resolutions adopted by the Boards of Directors of these corporations, and the Powers of Attorney issued pursuant thereto, are true and correct, and that both the Resolutions and the Powers of Attorney are in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the facsimile seal of each corporation

this 23rd day of October, 2001

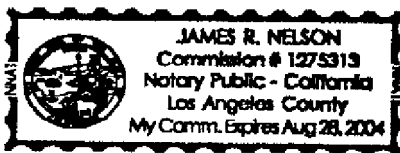


Elizabeth M. Tuck
Elizabeth M. Tuck, Secretary

CALIFORNIA ALL-PURPOSE ACKNOWLEDGMENT

State of California
County of Los Angeles
On October 24, 2001 before me, James R. Nelson, Notary Public
Date Name and Title of Officer (e.g., "Jane Doe, Notary Public")
personally appeared John H. Mullan
Name(s) of Signer(s)

☒ personally known to me - OR - ☐ proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.



WITNESS my hand and official seal.

James R. Nelson
Signature of Notary Public

OPTIONAL

Though the information below is not required by law, it may prove valuable to persons relying on the document and could prevent fraudulent removal and reattachment of this form to another document.

Description of Attached Document

Title or Type of Document: Performance Bond
Document Date: October 23, 2001 Number of Pages: 1
Signer(s) Other Than Named Above: C.K. Nakamura

Capacity(ies) Claimed by Signer(s)

Signer's Name: John H. Mullan

- ☐ Individual
☒ Corporate Officer
Title(s): Vice President & Secretary
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing:

Northrop Grumman Corporation

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here

Signer's Name: _____

- ☐ Individual
☐ Corporate Officer
Title(s): _____
☐ Partner — ☐ Limited ☐ General
☐ Attorney-in-Fact
☐ Trustee
☐ Guardian or Conservator
☐ Other: _____

Signer Is Representing:

RIGHT THUMBPRINT
OF SIGNER
Top of thumb here



RIGHT OF WAY CONSTRUCTION PERMIT

CITY OF ANAHEIM - DEPARTMENT OF PUBLIC WORKS

200 SOUTH ANAHEIM BOULEVARD (714) 765-4431

PERMIT NO: RCP2001-02972

DATE: 12/06/2001

TIME: 3:00 PM

LOCATION: Within the bounds of Liberty Avenue 16 feet east of National Street and 40 feet north of center on Liberty.

QUARTER SECTION MAP NO: 69

WORK TO BE DONE: Excavate / drill to install one cluster monitoring well.

ASSOCIATED PLAN(S)

Type of Work	Plan Description	Ref#	Attached
Groundwater Well Installation	Attached well permit and traffic control sketch	ENC2001-00021	Y
STARTING DATE: 12/10/2001		ENDING DATE: 02/10/2002	

This permit expires 60 days from starting date if the work has not commenced or the ending date, whichever is later.

CONTRACTOR:	ENVIRONMENTAL ENGINEERING & CO		
ADDRESS:	515 N CABRILLO PARK DR #120		
CITY/ST/ZIP:	SANTA ANA CA 92701 0000	BUSINESS PHONE: 714 667-2300	
		Tom Titus	
	ENVIRONMENTAL ENGINEERING & CONTRACTING, INC		
GENERAL ENGINEERING, CLASS A, LICENSE NO:	743267	EXP: 11/30/2003	
BUSINESS CITY LICENSE NO:	BUS2000-00069	EXP: 09/20/2002	

PERMIT FEE: 176.00

INSPECTION DTF NO: FM23

IMPORTANT:

I agree to comply with the Rules and Regulations adopted by the Director of Public Works (attached to this permit), all provisions of the City Ordinances, Resolutions, Standards and Specifications currently in force, copies of which are available from the Development Services Division at 200 South Anaheim Boulevard, Anaheim. By signing and accepting this Permit, the Permittee states that he has or will notify, at least 48 hours prior to starting any work, the following:

☒ Public Works Field Inspection 714-765-5126 ✓ Field Inspector: Michael Wood
☒ City Water Utilities 714-765-4224 ✓
☒ Underground Service Alert (USA) 1-800-422-4133 ✓

Contact the following for specific questions or problems regarding the applicable utility:

The Gas Company	714-529-2889	Defense Fuel Support Point	562-921-2271
Southern California Edison	714-870-3225	Kinder Morgan Energy Partners	714-538-5227
Metropolitan Water District	213-217-6000	(formerly Santa Fe Pacific Pipeline)	
Arco Pipeline Company	562-428-9000	City Electrical Utilities	714-765-6843
		City Water Utilities	714-765-5268

SPECIAL CONDITIONS:

- 1.) THE CONTRACTOR SHALL SCHEDULE A PRECONSTRUCTION MEETING WITH THE PUBLIC WORKS FIELD INSPECTOR PRIOR TO START OF ANY WORK.

Traffic control to be per the attached sketch, comply with the latest edition of the WATCH Manual and or as may be directed by Field Engineering.

Traffic control / work site may be in place on a 24 hour basis during the drilling operations approximately 2 weeks, provided no conflicts with the area businesses / safety.

Site to be maintained for run off and debris and secure from pedestrians / vehicles.

Site to be re-stored and clean per City Rules and Regulations and to any City Standards as applicable.

- 2.) Contractor shall comply with all terms of Encroachment License No. ENC2001-00021.
- 3.) Permit No. ENC2001-00021 and Well permit No. 0791 are related to this case.

OBTAIN UNDERGROUND SERVICE ALERT NO. AND PROVIDE TO FIELD INSPECTOR PRIOR TO STARTING EXCAVATION.

DISTRIBUTION: Applicant, Field Engineering, Development Services
1 of 2

NGSC-RWQCB012250



RIGHT OF WAY CONSTRUCTION PERMIT
CITY OF ANAHEIM - DEPARTMENT OF PUBLIC WORKS

200 SOUTH ANAHEIM BOULEVARD (714) 765-4431

PERMIT NO: RCP2001-02972

DATE: 12/06/2001

TIME: 3:00 PM

Permit Approved for the City Engineer

X

Robert Luciano

12/06/2001

Applicant or Authorized Agent

X

Tom Titus, Senior Geologist, E. E. C. Inc.

12/06/2001

DISTRIBUTION: Applicant, Field Engineering, Development Services

2 of 2

NGSC-RWQCB012251

CITY OF ANAHEIM
DEPARTMENT OF PUBLIC WORKS
RIGHT-OF-WAY CONSTRUCTION PERMIT
RULES AND REGULATIONS
REVISION MAY 9, 2000

THESE RULES AND REGULATIONS ARE A PART OF THE PERMIT AND MUST REMAIN ATTACHED TO THE PERMIT AT THE JOB SITE.

1. GENERAL

1. Applicant agrees that it shall be his responsibility to provide the contractor, subcontractor, or an other agent responsible for construction of permitted use within the right-of-way, with a copy of the permit with these conditions attached and a complete set of approved plans.
2. A copy of the permit and approved plans shall be on-site whenever work is in progress.
3. Work shall be in accordance with City Standard Plans, Standard Specifications for Public Works Construction (Green Book), and approved plans, subject to inspection and approval by the Field Inspector.
4. Specific provisions and conditions may be appended to each permit by the City Engineer at the time of issuance of the permit or at any time thereafter, prescribe such additional conditions as he may deem necessary for the protection of the street or for the prevention of undue interference with traffic or to assure the safety of persons using the street until completion of the work.
5. Permit is void if work is not completed prior to expiration date noted hereon. An extension may be granted if such extension is applied for 24 hours before the permit expires.

2. NOTIFICATION

1. **PERMITTEE MUST NOTIFY THE FIELD INSPECTION OFFICE (714 765-5126) 48 HOURS PRIOR TO START OF CONSTRUCTION.**
2. Permittee must notify and receive approval of Underground Service Alert at 1-800-422-4133 a minimum of two full working days prior to start of construction. USA ticket number must be available at the construction site and provided to the City's Representative.
3. Permittee must notify the Chief of Survey (714 765-5126) at least two working days prior to removing any survey monuments. All monuments must be replaced at the permittee's expense. All monuments must be replaced in their original positions and such replacement must be done by a person authorized to practice land surveying. The appropriate records shall be filed with the Orange County surveyor in accordance with Chapter 15; Section 8771 of the Business and Professions Code. A copy of the recorded documents shall be delivered to the Chief of Survey prior to release of the project.
4. Permittee shall notify and receive approval of Traffic Engineering (714 765-5183) 24 hours prior to cutting any traffic signal interconnect conduit or loop detectors.

3. WORK HOURS

1. **LOCAL STREETS - NO WORK SHALL BEGIN BEFORE 7:00 A.M. OR CONTINUE AFTER 7:00 P.M.
ARTERIAL STREETS - NO WORK SHALL BEGIN IN THE TRAVEL LANES BEFORE 8:30 A.M. OR CONTINUE AFTER 3:30 P.M.**
2. Absolutely no work is permitted on Saturdays, Sundays, or holidays unless specifically approved by the Field Engineer.

- c. Spandrels - entire spandrel, including curb.
 - d. Sidewalk - minimum removal/replacement area shall be twenty square feet or scoreline to scoreline, whichever is greater.
 - e. Sidewalk landings - entire landing unless approved otherwise by the City Engineer. Replacement of spandrels or sidewalk landings shall require installation of a wheel chair ramp if none exists.
 - f. Concrete alleys shall have a minimum trench width of forty-eight inches and a minimum depth of six inches with a minimum compressive strength of 3000 psi.
3. All concrete removals shall be to the nearest cold joint or score joint, or saw cut if said joint is more than five feet from work limits. Saw cuts shall be full depth cut with a concrete saw.

9. ASPHALT PAVING

- 1. Asphalt paving repairs shall be per City Standard No. 146 based on the age of the pavement, direction of trench, and type of backfill. When streets are scheduled for reconstruction/resurfacing within two years, the City Engineer may reduce the pavement repair standards. Any deviation from standards must be specified on the approved plans or permit.
- 2. Trenches shall be backfilled at the conclusion of each days work unless otherwise permitted by the Public Works Department. Trenches shall be covered with temporary paving or plated, if approved by the Field Engineer.
- 3. Cold mix A.C. may be used for temporary overnight surfacing only. Hot mix base course A.C. must be placed within 24 hours of backfilling the excavation.
- 4. Finish course asphalt concrete shall be placed within one week of base paving.
- 5. Traffic bearing plates may be used for covering excavations overnight only, subject to approval of the Field Engineer and the following guidelines:
 - a. Steel plates for bridging must extend a minimum of 3000 mm (12") beyond the edges of the trench.
 - b. Steel plate bridging shall be installed to operate with minimum noise.
 - c. The trench shall be adequately shored, to support the bridging and traffic loads.
 - d. Temporary paving with cold asphalt concrete shall be used to feather the edges of the plates.
 - e. Bridging shall be secured against displacement by using adjustable cleats, shims or other devices.
 - f. A rough road sign (W33) with black lettering on an orange background, shall be used in advance of steel plate bridging. This is to be used along with any other required construction signing.
- 6. No section of asphalt pavement between the trench line and gutter which is four feet wide or less shall remain. The asphalt in this area shall be removed, base paved, and capped with the adjacent trench paving.
- 7. Finish course asphalt concrete shall be placed within one week of backfilling.

CITY OF ANAHEIM
PUBLIC UTILITIES DEPARTMENT
WATER ENGINEERING DIVISION
201 South Anaheim Blvd. - 6th Floor - Suite 601
Anaheim, CA 92805 • (714) 254-4231

COLLECTION OFFICERS RECEIPT FOR WELL CONSTRUCTION OR DESTRUCTION PERMIT

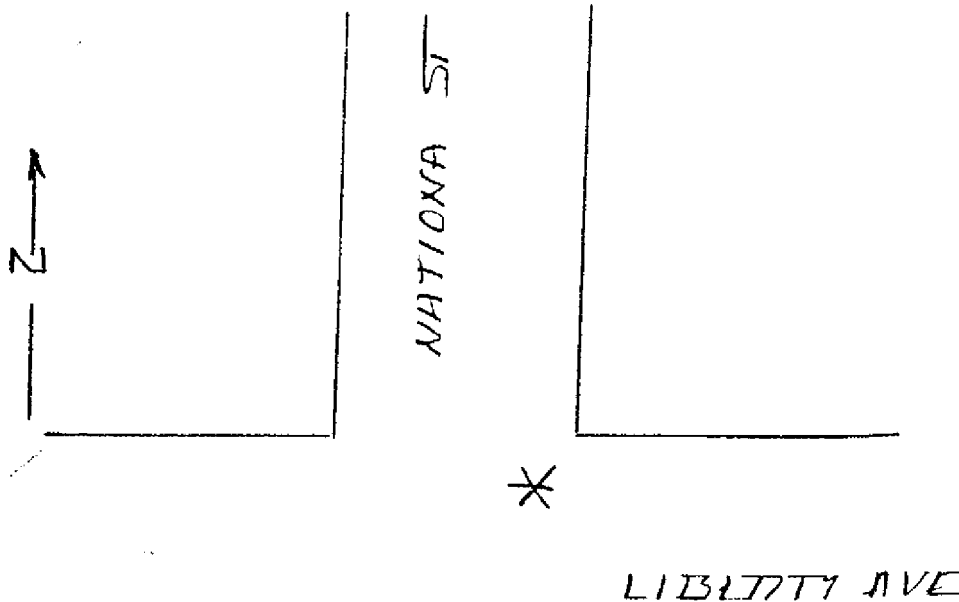
Date SEPT 19 2001

APPLICANT INFORMATION

APPLICANT'S NAME TDM TITUS NAME OF FIRM E E C SERVIZIONI ENG. CONSU
STREET ADDRESS 515 N. CARROLL PARK DR #170 CITY SANTA ANA CA
ZIP 92701 (TELEPHONE (714) 667-7300)

WELL INFORMATION

NAME OF OWNER CITY OF ANAHEIM RIW ADDRESS 200 S. ANAHEIM BL.
CITY ANAHEIM STATE CA ZIP PHONE ()
LOCATION OF WELL DIST. NO.
TYPE OF WELL WELL NO. (If Known) STATE O.C.W.D.
DIAGRAM OF WELL SITE



WATER ENGINEERING INSPECTION MUST BE SCHEDULED 48 HRS. PRIOR TO STARTING WORK AT (714) 254-5268- 765.4591

METHOD OF CONSTRUCTION OR DESTRUCTION:

- ☐ WELL SHALL BE DESTROYED PER STANDARD DRAWING NO. W-630
☒ WELL TO BE DRILLED PER ATTACHED APPROVED PLANS
☐ OTHER

Type of Permit: ☐ DESTRUCTION ☒ NEW CONSTRUCTION ☐ RECONSTRUCTION

PERMIT FEE \$ 135.00

I hereby agree to comply with all ordinances, rules and regulations of the City of Anaheim pertaining to well construction, reconstruction or destruction.

Signature: [Signature] Receipt: 0103415
PERMIT ISSUED BY [Signature] 11.11.01

Signed: [Signature] DATE: 9-19-01

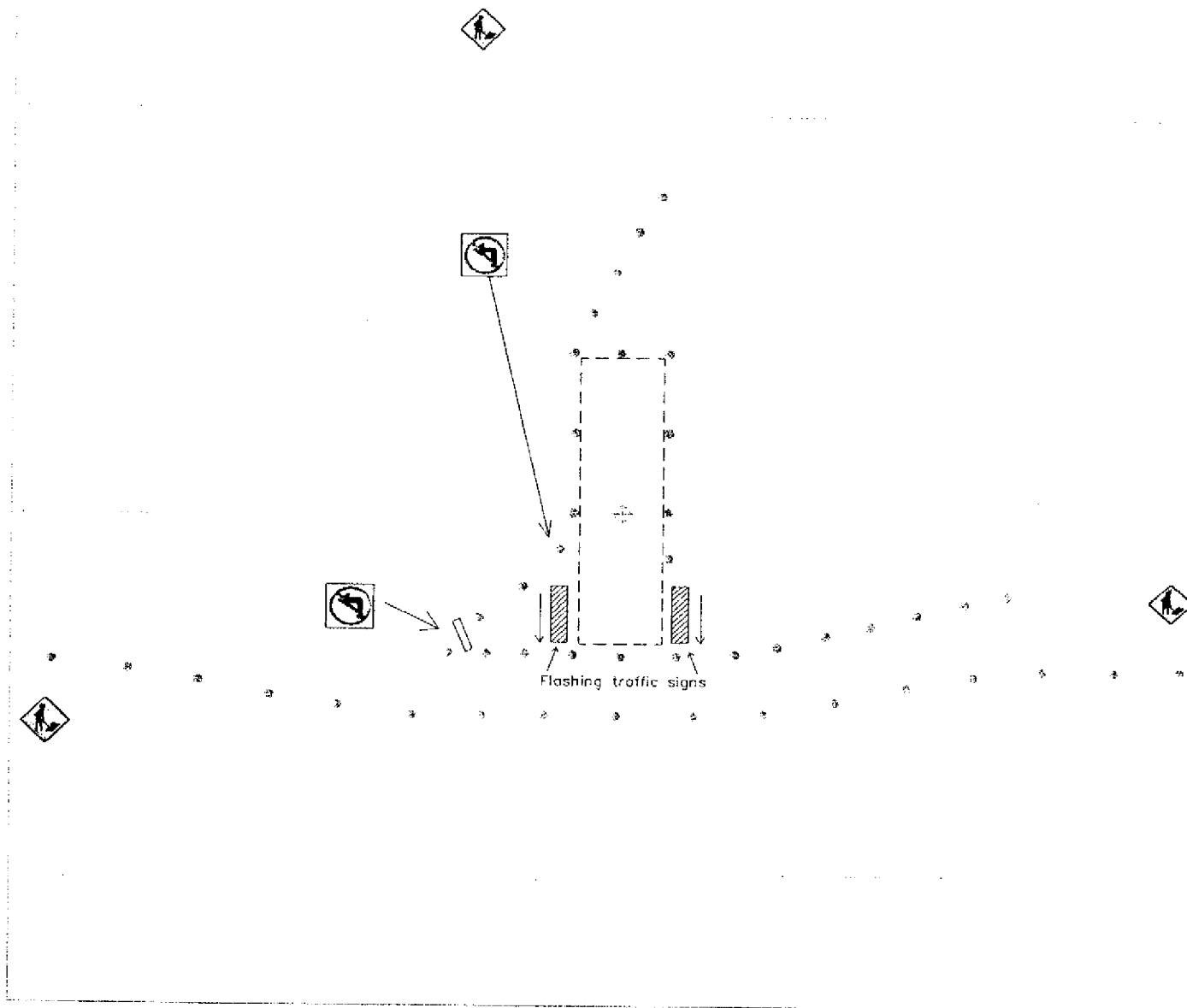
INSPECTED BY DATE

FUND DISTRIBUTION

FUND	AGV	ORG	REV SACE	W.O.
501	521	3242	9015	00030226

DISTRIBUTION
WHITE - APPLICANT
GREEN - WATER DIVISION
CANARY - ACCOUNTING
PINK - INSPECTOR
GOLDENROD - COLLECTIONS

WELL
PERMIT NO. 0791



LEGEND

- Proposed Monitoring Well
- Delineator
- Work Area

0 20 40 80
SCALE Feet



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

Map Source: Modified from a map provided by Tait and Associates, and by field measurements made by EEC.

PROPOSED TRAFFIC PLAN
Northrop Grumman Corporation
Former Y-12 Facility
Anaheim, California

File:
S48700803

Date:
09/13/01

PM:
TT

R.G./P.E.
MTZ

PROJECT NO.
S487-8/2

FIGURE
1

1 ENCROACHMENT AGREEMENT

2 (ENC2001-00021)

3 THIS LICENSE is issued by the
4 CITY OF ANAHEIM, a chartered city and
5 municipal corporation,
hereinafter referred to as "ANAHEIM,"

6 T
7 O

8 NORTHROP GRUMMAN CORPORATION,
hereinafter referred to as "LICENSEE."

9 RECITALS

10 THIS LICENSE is granted by ANAHEIM in contemplation of the
11 following recitals:

12 WHEREAS, ANAHEIM owns an easement, right-of-way, or fee
13 title to that property described on Exhibit "A" attached hereto
14 and incorporated herein by reference (hereinafter "PROPERTY");
15 and,

16 WHEREAS, LICENSEE wishes to utilize a certain portion of
17 PROPERTY for the purposes particularly described in Exhibit "B"
18 attached hereto and incorporated herein by reference
19 (hereinafter "ENCROACHMENT"); and,

20 WHEREAS, the proposed ENCROACHMENT, if properly
21 installed, maintained and removed will not unreasonably
22 interfere with the present use of PROPERTY by ANAHEIM or the
23 public generally.

24 NOW, THEREFORE, in consideration of the foregoing and
25 in the exercise of ANAHEIM'S police power and its ownership
26 powers in PROPERTY, the following LICENSE is granted subject to
27
28

1 OF ANAHEIM
600 S. ANAHEIM BOULEVARD, SUITE 366
ANAHEIM, CALIFORNIA 92805
(714) 254-5169
FAX (714) 254-5123

1 the following conditions.

2 //

3 1.) LICENSEE does hereby represent that each of the
4 representations set forth in the foregoing Recitals and
5 LICENSEE'S application for this LICENSE is true.

6 2.) ANAHEIM does hereby grant to LICENSEE a LICENSE,
7 personal to the LICENSEE, to enter upon and use PROPERTY of
8 ANAHEIM for the purpose of constructing and maintaining
9 ENCROACHMENT on that portion of PROPERTY in the manner and at
10 the location herein described.

11 3.) LICENSEE agrees that ENCROACHMENT shall be placed at
12 the location designated in LICENSEE'S application, in strict
13 accordance with specifications set forth in LICENSEE'S
14 application, and in strict accordance with the conditions set
15 forth in this LICENSE.

16 4.) LICENSEE hereby agrees to, and does hereby, indemnify
17 and hold ANAHEIM, its officers and employees harmless from any
18 liability for any damage, claims, or injury of any kind to any
19 person or property by reason of the placement of ENCROACHMENT by
20 LICENSEE upon PROPERTY or any negligent acts by LICENSEE, its
21 employees, agents or others, excluding therefrom only that
22 liability arising from the sole negligence of ANAHEIM. This
23 indemnity shall survive the termination of this LICENSE for a
24 period of five (5) years.

25 5.) LICENSEE agrees to so maintain ENCROACHMENT so as not
26 to cause any unreasonable interference whatsoever with the use
27

28

1 of PROPERTY by ANAHEIM and to maintain such clearances as are
2 required by law or ordered by ANAHEIM from other ANAHEIM or
3 other private or public utilities. LICENSEE agrees to comply
4 with all applicable State and local laws in the installation,
5 operation, maintenance and removal or destruction of
6 ENCROACHMENT.

7 6.) ANAHEIM reserves the right to revoke all privileges
8 granted by this LICENSE upon giving LICENSEE written notice of
9 cancellation of this LICENSE; provided, however, ANAHEIM will
10 endeavor to give thirty (30) days notice of cancellation when
11 possible. Upon such written notice being given by ANAHEIM to
12 LICENSEE, LICENSEE shall remove ENCROACHMENT from PROPERTY and
13 restore PROPERTY to its unobstructed and pre-existing condition.
14 LICENSEE hereby irrevocably grants to ANAHEIM the right to
15 remove ENCROACHMENT at LICENSEE's expense in the event LICENSEE
16 should fail after written notice to LICENSEE to remove
17 ENCROACHMENT as required herein.

18 7.) LICENSEE agrees that the use of the portion of
19 PROPERTY for ENCROACHMENT will in no way create any right
20 whatsoever in LICENSEE which is adverse to any rights of ANAHEIM
21 or the public; that the rights of LICENSEE are the rights herein
22 given by this LICENSE and no other rights whatsoever; that no
23 contractual relationship is entered between the parties; and
24 that LICENSEE'S rights are not coupled with any interest.

25 8.) Any privilege conferred by this LICENSE is personal to
26 the LICENSEE and is not assignable or transferable.

27

28

1 9.) Intentionally left blank.

2 10.) LICENSEE acknowledges that this LICENSE, if granted by
3 the Director of Public Works (Director), is granted subject to
4 the limitations imposed in the Resolution of the City Council
5 wherein the authority to issue such LICENSE is delegated to the
6 Director.

7 11.) Unless a different date is provided in this LICENSE,
8 the effective date of this LICENSE shall be the Date of
9 Acceptance by LICENSEE set forth below.

10 12.) LICENSEE acknowledges that LICENSEE must secure a
11 separate well permit from ANAHEIM prior to commencing any
12 drilling and separate right-of-way construction permits prior to
13 commencing work in any street.

14 13.) LICENSEE shall provide to ANAHEIM a good and
15 sufficient surety bond, in a surety acceptable to ANAHEIM, in
16 the amount specified by the Director of Public Works, as a
17 guaranty of LICENSEE's performance of all of LICENSEE'S
18 obligations under this License.

19
20 CITY OF ANAHEIM,
21 a municipal corporation

22
23 By 
24 Director of Public Works/
25 City Engineer
26
27
28

1
2 I hereby accept this License and agree to be bound by all of the
3 terms and conditions of said License.

4 Date of Acceptance: December 3, 2001.

5 Northrop Grumman Corporation

6 By: 

7 A.J. Paz
8 Director, Facilities And
Real Estate
9 Northrop Grumman Corporation

"LICENSEE"

10 APPROVED AS TO FORM:

11 JACK L. WHITE, CITY ATTORNEY

12 By 

13 Malcolm Slaughter
14 Deputy City Attorney
15
16
17
18
19
20
21
22
23
24
25
26
27
28

1 UT ANAHEIM
100 S. ANAHEIM, CALIFORNIA 92805
(714) 254-5189
FAX (714) 254-5123

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

EXHIBIT A

PROPERTY OF ANAHEIM

Those certain rights-of-way of Liberty Avenue and National Street.

EXHIBIT B

ENCROACHMENT

A groundwater cluster monitoring well in the intersection of those streets described in Exhibit A.

OF /
200 S. ANAHEIM BOULEVARD, SUITE 306
ANAHEIM, CALIFORNIA 92805
(714) 294-5189
FAX (714) 254-6123

APPENDIX B
Soil Boring Log



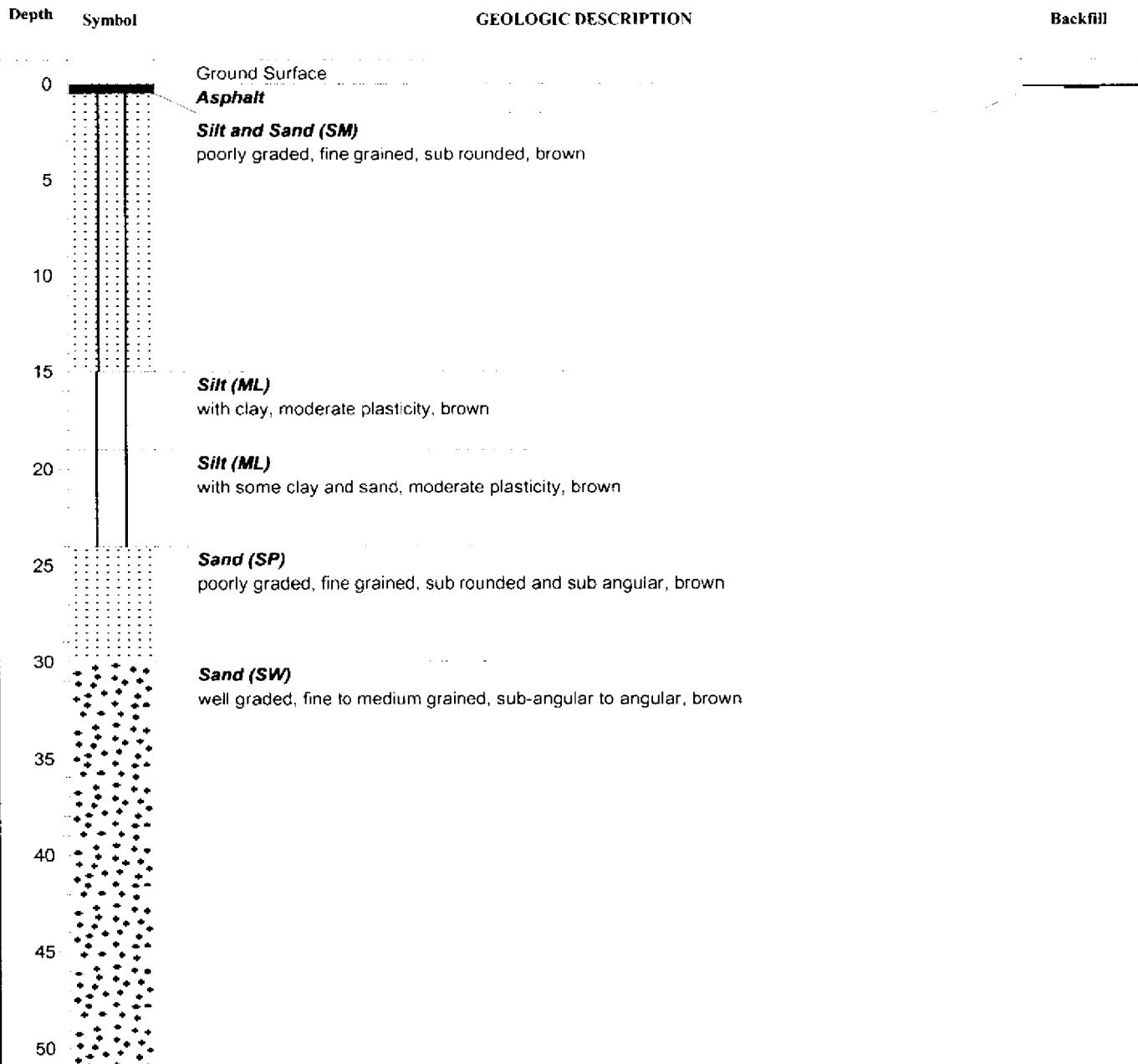
Log of Boring: NMW-9

Logged By: Tom Titus
Reviewed By: Mark Zeko
Registration #: 6278

Project No: S487-8/2
Project: Northrop Y-12
Client: Northrop
City, State: Anaheim, CA
Location: Liberty and National

Sheet: 1 of 5
Date: 12-17-01 - 12-18-01
Surface Elevation: N/A
Well Elevation N/A

SUBSURFACE PROFILE



Driller: Water Development
Drill Rig: Speedstar 30K
Boring Diameter: 14.5"
Backfill: N/A

Screened Interval: 80'-90', 110'-120', 190'-200'
Casing Diameter: 16.0"
Screen Size: 0.020
Gravel Pack: 2/12



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

Log of Boring: NMW-9

Logged By: Tom Titus
Reviewed By: Mark Zeko
Registration #: 6278

Project No: S487-8/2
Project: Northrop Y-12
Client: Northrop
City, State: Anaheim, CA
Location: Liberty and National

Sheet: 2 of 5
Date: 12-17-01 - 12-18-01
Surface Elevation: N/A
Well Elevation: N/A

SUBSURFACE PROFILE

Depth	Symbol	GEOLOGIC DESCRIPTION	Backfill
55		Sand (SW) well graded, fine to medium grained, sub-angular to angular, brown	
60			
65			
70		Sand (SP) poorly graded, fine to medium grained, sub-rounded to round, brown	
75			
80		Sand and Silt (SM) poorly graded, fine to medium grained, sub-rounded, brown	
85		Silt (ML) with sand, poorly graded, fine to medium grained sub-rounded, brown	
90		Clay and Silt (CL) with some fine to medium sands, low plasticity, fine to medium grained, brown	
95			
100			

Driller: Water Development
Drill Rig: Speedstar 30K
Boring Diameter: 14.5"
Backfill: N/A

Screened Interval: 80'-90', 110'-120', 190'-200'
Casing Diameter: 16.0"
Screen Size: 0.020
Gravel Pack: 2/12



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

Log of Boring: NMW-9

Logged By: Tom Titus
Reviewed By: Mark Zeko
Registration #: 6278

Project No: S487-8/2
Project: Northrop Y-12
Client: Northrop
City, State: Anaheim, CA
Location: Liberty and National

Sheet: 3 of 5
Date: 12-17-01 - 12-18-01
Surface Elevation: N/A
Well Elevation: N/A

SUBSURFACE PROFILE

Depth	Symbol	GEOLOGIC DESCRIPTION	Backfill
105		Clay and Silt (CL) with some fine to medium sands, low plasticity, fine to medium grained, brown	
110		Silty sand (SC) with clay, fine to medium grained sub-rounded to sub-angular, brown	
115			
120		Sand (SP) poorly graded, fine to moderate grained, sub-rounded, brown	
125			
130		Sand (SW) well graded sand, medium to coarse grained, round to angular, brown	
135			
140		Sand (SP) medium grained, sub-rounded to sub-angular, brown	
145			
150		trace amounts of gravel	

Driller: Water Development
Drill Rig: Speedstar 30K
Boring Diameter: 14.5"
Backfill: N/A

Screened Interval: 80'-90', 110'-120', 190'-200'
Casing Diameter: 16.0"
Screen Size: 0.020
Gravel Pack: 2/12



ENVIRONMENTAL
ENGINEERING & CONTRACTING, INC.

Log of Boring: NMW-9

Logged By: Tom Titus
Reviewed By: Mark Zeko
Registration #: 6278

Project No: S487-8/2
Project: Northrop Y-12
Client: Northrop
City, State: Anaheim, CA
Location: Liberty and National

Sheet: 4 of 5
Date: 12-17-01 - 12-18-01
Surface Elevation: N/A
Well Elevation: N/A

SUBSURFACE PROFILE

Depth	Symbol	GEOLOGIC DESCRIPTION	Backfill
155		Sand (SP) medium grained, sub-rounded to sub-angular, brown	
160			
165			
170			
175		Sand (SW) well graded, medium to coarse grained, sub-angular to angular, brown	
180			
185		Sand (SP) poorly graded, medium grained, sub-rounded to sub-angular, brown	
190		trace amounts of fine gravels	
195			
200			

Driller: Water Development
Drill Rig: Speedstar 30K
Boring Diameter: 14.5"
Backfill: N/A

Screened Interval: 80'-90', 110'-120', 190'-200'
Casing Diameter: 16.0"
Screen Size: 0.020
Gravel Pack: 2/12



Log of Boring: NMW-9

Logged By: Tom Titus
Reviewed By: Mark Zeko
Registration #: 6278

Project No: S487-8/2
Project: Northrop Y-12
Client: Northrop
City, State: Anaheim, CA
Location: Liberty and National

Sheet: 5 of 5
Date: 12-17-01 - 12-18-01
Surface Elevation: N/A
Well Elevation: N/A

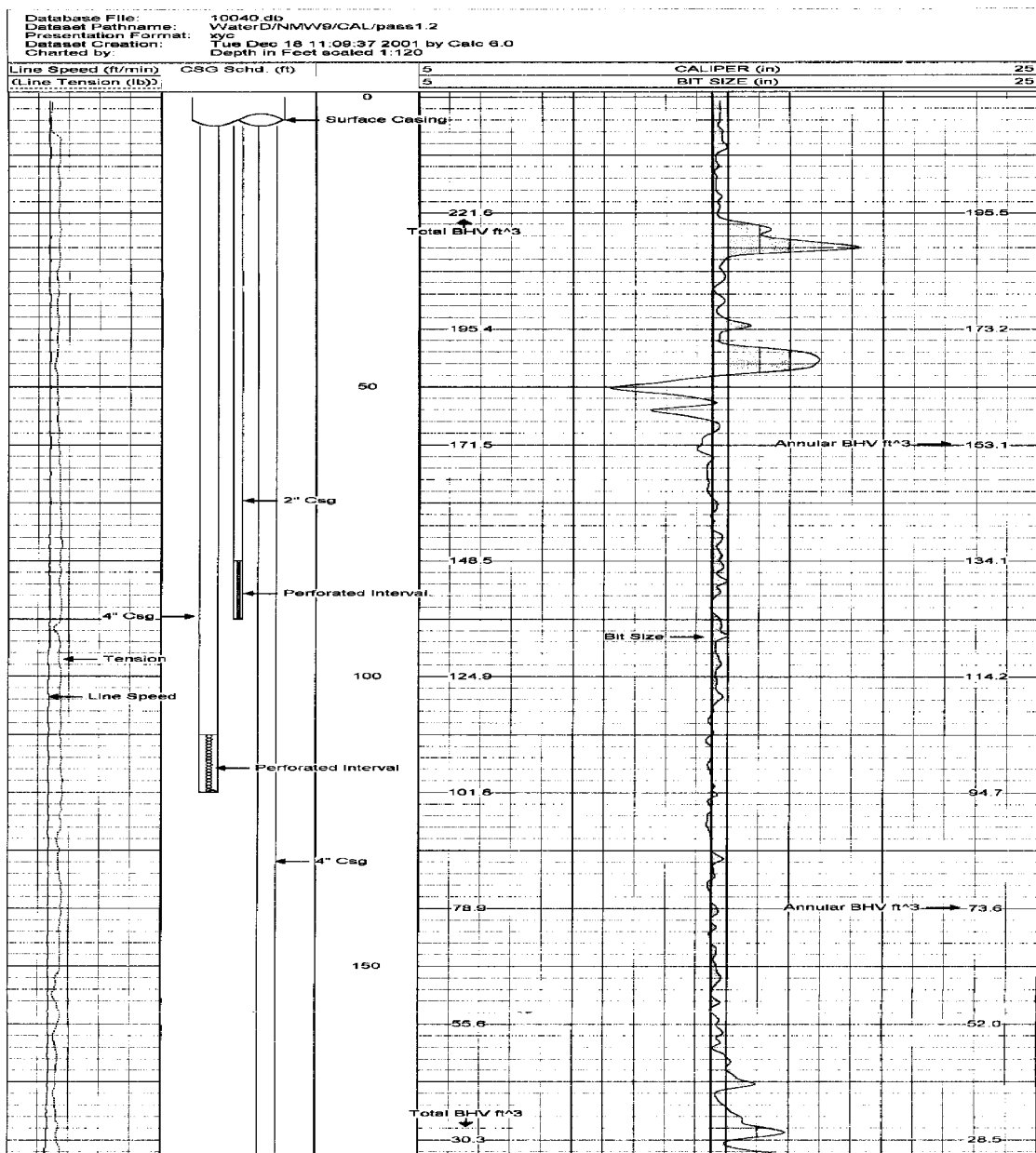
SUBSURFACE PROFILE

Depth	Symbol	GEOLOGIC DESCRIPTION	Backfill
205		Gravel (GP) with trace amounts of silt and sand, poorly graded, sub-angular to angular, brown	
210		End of Boring (210 feet)	
215			
220			
225			
230			
235			
240			
245			
250			

Driller: Water Development
Drill Rig: Speedstar 30K
Boring Diameter: 14.5"
Backfill: N/A

Screened Interval: 80'-90', 110'-120', 190'-200'
Casing Diameter: 16.0"
Screen Size: 0.020
Gravel Pack: 2/12

APPENDIX C
Geophysical Logs



APPENDIX D
Laboratory Reports

**ASSOCIATED LABORATORIES****806 North Batavia - Orange, California 92868 - 714/771-6900**

5457-8/2

FAX 714/538-1209

CLIENT EEC (6633)
ATTN: Mark Zeko
515 North Cabrillo Park Drive
Suite 120
Santa Ana, CA 92701

LAB REQUEST 86011**REPORTED** 01/14/2002**RECEIVED** 01/04/2002**PROJECT** Northrop Y-12**SUBMITTER** Client**COMMENTS** "J" denotes value between MDL and DLR.

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.

318054

318055

Client Sample Identification

NMW-9-200'

NMW-9-120'

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

The reports of the Associated Laboratories are confidential property of our clients and may not be reproduced or used for publication in part or in full without our written permission. This is for the mutual protection of the public, our clients, and ourselves.

TESTING & CONSULTING
Chemical
Microbiological
Environmental

Lab request 86011 cover, page 1 of 1

NGSC-RWQCB012273

Order #: 318054

Matrix: WATER

Date Sampled: 01/03/2002

Time Sampled: 12:50

Sampled By:

Client: EEC

Client Sample ID: NMW-9-200'

Analyte	Result	DF	DLR	Units	Date/Analyst
8260B Volatile Organic Compounds					
1,1,1,2-Tetrachloroethane	ND	1	5	ug/L	01/08/02 AM
1,1,1-Trichloroethane	ND	1	5	ug/L	01/08/02 AM
1,1,2,2-Tetrachloroethane	ND	1	5	ug/L	01/08/02 AM
1,1,2-Trichloroethane	ND	1	5	ug/L	01/08/02 AM
1,1,2-Trichlorotrifluoroethane	ND	1	5	ug/L	01/08/02 AM
1,1-Dichloroethane	ND	1	5	ug/L	01/08/02 AM
1,1-Dichloroethene	ND	1	5	ug/L	01/08/02 AM
1,1-Dichloropropene	ND	1	5	ug/L	01/08/02 AM
1,2,3-Trichlorobenzene	ND	1	5	ug/L	01/08/02 AM
1,2,3-Trichloropropane	ND	1	5	ug/L	01/08/02 AM
1,2,4-Trichlorobenzene	ND	1	5	ug/L	01/08/02 AM
1,2,4-Trimethylbenzene	ND	1	5	ug/L	01/08/02 AM
1,2-Dibromo-3-chloropropane	ND	1	5	ug/L	01/08/02 AM
1,2-Dibromoethane	ND	1	5	ug/L	01/08/02 AM
1,2-Dichlorobenzene	ND	1	5	ug/L	01/08/02 AM
1,2-Dichloroethane	ND	1	5	ug/L	01/08/02 AM
1,2-Dichloropropane	ND	1	5	ug/L	01/08/02 AM
1,3,5-Trimethylbenzene	ND	1	5	ug/L	01/08/02 AM
1,3-Dichlorobenzene	ND	1	5	ug/L	01/08/02 AM
1,3-Dichloropropane	ND	1	5	ug/L	01/08/02 AM
1,4-Dichlorobenzene	ND	1	5	ug/L	01/08/02 AM
1,4-Dioxane	ND	1	5	ug/L	01/08/02 AM
1-Chlorohexane	ND	1	57	ug/L	01/08/02 AM
2,2-Dichloropropane	ND	1	5	ug/L	01/08/02 AM
2-Butanone (MEK)	ND	1	5	ug/L	01/08/02 AM
2-Chloroethyl vinyl ether	ND	1	100	ug/L	01/08/02 AM
2-Chlorotoluene	ND	1	5	ug/L	01/08/02 AM
2-Hexanone	ND	1	5	ug/L	01/08/02 AM
4-Chlorotoluene	ND	1	20	ug/L	01/08/02 AM
4-Methyl -2- Pentanone	ND	1	5	ug/L	01/08/02 AM
Acetone	ND	1	10	ug/L	01/08/02 AM
Acetonitrile	ND	1	100	ug/L	01/08/02 AM
	ND	1	50	ug/L	01/08/02 AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Lab Request 86011 results, page 1 of 6

NGSC-RWQCB012274

Order #: 318054

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9-200'

Date Sampled: 01/03/2002

Time Sampled: 12:50

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
9260B Volatile Organic Compounds					
Acrolein	ND	1	200	ug/L	01/08/02 AM
Acrylonitrile	ND	1	10	ug/L	01/08/02 AM
Allyl chloride	ND	1	5	ug/L	01/08/02 AM
Benzene	ND	1	1	ug/L	01/08/02 AM
Benzyl chloride	ND	1	5	ug/L	01/08/02 AM
Bromobenzene	ND	1	5	ug/L	01/08/02 AM
Bromochloromethane	ND	1	5	ug/L	01/08/02 AM
Bromodichloromethane	ND	1	5	ug/L	01/08/02 AM
Bromoform	ND	1	5	ug/L	01/08/02 AM
Bromomethane	ND	1	5	ug/L	01/08/02 AM
Carbon Disulfide	ND	1	5	ug/L	01/08/02 AM
Carbon tetrachloride	ND	1	5	ug/L	01/08/02 AM
Chlorobenzene	ND	1	5	ug/L	01/08/02 AM
Chloroethane	ND	1	5	ug/L	01/08/02 AM
Chloroform	ND	1	5	ug/L	01/08/02 AM
Chloromethane	ND	1	5	ug/L	01/08/02 AM
Dibromochloromethane	ND	1	5	ug/L	01/08/02 AM
Dibromomethane	ND	1	5	ug/L	01/08/02 AM
Dichlorodifluoromethane	ND	1	5	ug/L	01/08/02 AM
Ethyl benzene	ND	1	5	ug/L	01/08/02 AM
Ethyl methacrylate	ND	1	50	ug/L	01/08/02 AM
Hexachlorobutadiene	ND	1	5	ug/L	01/08/02 AM
Iodomethane	ND	1	5	ug/L	01/08/02 AM
Isopropylbenzene (Cumene)	ND	1	5	ug/L	01/08/02 AM
Methacrylonitrile	ND	1	35	ug/L	01/08/02 AM
Methyl methacrylate	ND	1	5	ug/L	01/08/02 AM
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/08/02 AM
Methylene chloride	ND	1	5	ug/L	01/08/02 AM
Naphthalene	ND	1	5	ug/L	01/08/02 AM
Pentachloroethane	ND	1	5	ug/L	01/08/02 AM
Propionitrile	ND	1	100	ug/L	01/08/02 AM
Styrene	ND	1	5	ug/L	01/08/02 AM
Tetrachloroethene	3.2 J	1	5	ug/L	01/08/02 AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 318054

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9-200'

Date Sampled: 01/03/2002

Time Sampled: 12:50

Sampled By:

Analyte**Result DF DLR Units Date/Analyst****8260B Volatile Organic Compounds**

Toluene	ND	1	5	ug/L	01/08/02	AM
Trichloroethene	1.1 J	1	5	ug/L	01/08/02	AM
Trichlorofluoromethane	ND	1	5	ug/L	01/08/02	AM
Vinyl acetate	ND	1	50	ug/L	01/08/02	AM
Vinyl chloride	ND	1	5	ug/L	01/08/02	AM
Xylenes, total	ND	1	5	ug/L	01/08/02	AM
cis-1,2-Dichloroethene	ND	1	5	ug/L	01/08/02	AM
cis-1,3-Dichloropropene	ND	1	5	ug/L	01/08/02	AM
cis-1,4-Dichloro-2-butene	ND	1	20	ug/L	01/08/02	AM
m and p-Xylene	ND	1	5	ug/L	01/08/02	AM
n-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
n-Propylbenzene	ND	1	5	ug/L	01/08/02	AM
o-Xylene	ND	1	5	ug/L	01/08/02	AM
p-Isopropyltoluene	ND	1	5	ug/L	01/08/02	AM
sec-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
tert-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
trans-1,2-Dichloroethene	ND	1	5	ug/L	01/08/02	AM
trans-1,3-Dichloropropene	ND	1	5	ug/L	01/08/02	AM
trans-1,4-Dichloro-2-butene	ND	1	20	ug/L	01/08/02	AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 318055

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9-120'

Date Sampled: 01/04/2002

Time Sampled: 11:20

Sampled By:

Analyte**Result****DF****DLR****Units****Date/Analyst****8260B Volatile Organic Compounds**

1,1,1,2-Tetrachloroethane	ND	1	5	ug/L	01/08/02	AM
1,1,1-Trichloroethane	ND	1	5	ug/L	01/08/02	AM
1,1,2,2-Tetrachloroethane	ND	1	5	ug/L	01/08/02	AM
1,1,2-Trichloroethane	ND	1	5	ug/L	01/08/02	AM
1,1,2-Trichlorotrifluoroethane	ND	1	5	ug/L	01/08/02	AM
1,1-Dichloroethane	ND	1	5	ug/L	01/08/02	AM
1,1-Dichloroethene	ND	1	5	ug/L	01/08/02	AM
1,1-Dichloropropene	ND	1	5	ug/L	01/08/02	AM
1,2,3-Trichlorobenzene	ND	1	5	ug/L	01/08/02	AM
1,2,3-Trichloropropane	ND	1	5	ug/L	01/08/02	AM
1,2,4-Trichlorobenzene	ND	1	5	ug/L	01/08/02	AM
1,2,4-Trimethylbenzene	ND	1	5	ug/L	01/08/02	AM
1,2-Dibromo-3-chloropropane	ND	1	5	ug/L	01/08/02	AM
1,2-Dibromoethane	ND	1	5	ug/L	01/08/02	AM
1,2-Dichlorobenzene	ND	1	5	ug/L	01/08/02	AM
1,2-Dichloroethane	ND	1	5	ug/L	01/08/02	AM
1,2-Dichloropropane	ND	1	5	ug/L	01/08/02	AM
1,3,5-Trimethylbenzene	ND	1	5	ug/L	01/08/02	AM
1,3-Dichlorobenzene	ND	1	5	ug/L	01/08/02	AM
1,3-Dichloropropane	ND	1	5	ug/L	01/08/02	AM
1,4-Dichlorobenzene	ND	1	5	ug/L	01/08/02	AM
1,4-Dioxane	ND	1	57	ug/L	01/08/02	AM
1-Chlorohexane	ND	1	5	ug/L	01/08/02	AM
2,2-Dichloropropane	ND	1	5	ug/L	01/08/02	AM
2-Butanone (MEK)	ND	1	100	ug/L	01/08/02	AM
2-Chloroethyl vinyl ether	ND	1	5	ug/L	01/08/02	AM
2-Chlorotoluene	ND	1	5	ug/L	01/08/02	AM
2-Hexanone	ND	1	20	ug/L	01/08/02	AM
4-Chlorotoluene	ND	1	5	ug/L	01/08/02	AM
4-Methyl -2- Pentanone	ND	1	10	ug/L	01/08/02	AM
Acetone	ND	1	100	ug/L	01/08/02	AM
Acetonitrile	ND	1	50	ug/L	01/08/02	AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 318055

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9-120'

Date Sampled: 01/04/2002

Time Sampled: 11:20

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
260B Volatile Organic Compounds					
Acrolein	ND	1	200	ug/L	01/08/02 AM
Acrylonitrile	ND	1	10	ug/L	01/08/02 AM
Allyl chloride	ND	1	5	ug/L	01/08/02 AM
Benzene	ND	1	1	ug/L	01/08/02 AM
Benzyl chloride	ND	1	5	ug/L	01/08/02 AM
Bromobenzene	ND	1	5	ug/L	01/08/02 AM
Bromochloromethane	ND	1	5	ug/L	01/08/02 AM
Bromodichloromethane	ND	1	5	ug/L	01/08/02 AM
Bromoform	ND	1	5	ug/L	01/08/02 AM
Bromomethane	ND	1	5	ug/L	01/08/02 AM
Carbon Disulfide	ND	1	5	ug/L	01/08/02 AM
Carbon tetrachloride	ND	1	5	ug/L	01/08/02 AM
Chlorobenzene	ND	1	5	ug/L	01/08/02 AM
Chloroethane	ND	1	5	ug/L	01/08/02 AM
Chloroform	ND	1	5	ug/L	01/08/02 AM
Chloromethane	ND	1	5	ug/L	01/08/02 AM
Dibromochloromethane	ND	1	5	ug/L	01/08/02 AM
Dibromomethane	ND	1	5	ug/L	01/08/02 AM
Dichlorodifluoromethane	ND	1	5	ug/L	01/08/02 AM
Ethyl benzene	ND	1	5	ug/L	01/08/02 AM
Ethyl methacrylate	ND	1	50	ug/L	01/08/02 AM
Hexachlorobutadiene	ND	1	5	ug/L	01/08/02 AM
Iodomethane	ND	1	5	ug/L	01/08/02 AM
Isopropylbenzene (Cumene)	ND	1	5	ug/L	01/08/02 AM
Methacrylonitrile	ND	1	35	ug/L	01/08/02 AM
Methyl methacrylate	ND	1	5	ug/L	01/08/02 AM
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/08/02 AM
Methylene chloride	ND	1	5	ug/L	01/08/02 AM
Naphthalene	ND	1	5	ug/L	01/08/02 AM
Pentachloroethane	ND	1	5	ug/L	01/08/02 AM
Propionitrile	ND	1	100	ug/L	01/08/02 AM
Styrene	ND	1	5	ug/L	01/08/02 AM
Tetrachloroethene	1.7 J	1	5	ug/L	01/08/02 AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report



Order #: 318055

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9-120'

Date Sampled: 01/04/2002

Time Sampled: 11:20

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
---------	--------	----	-----	-------	--------------

260B Volatile Organic Compounds

Toluene	ND	1	5	ug/L	01/08/02	AM
Trichloroethene	86	1	5	ug/L	01/08/02	AM
Trichlorofluoromethane	ND	1	5	ug/L	01/08/02	AM
Vinyl acetate	ND	1	50	ug/L	01/08/02	AM
Vinyl chloride	ND	1	5	ug/L	01/08/02	AM
Xylenes, total	ND	1	5	ug/L	01/08/02	AM
cis-1,2-Dichloroethene	ND	1	5	ug/L	01/08/02	AM
cis-1,3-Dichloropropene	ND	1	5	ug/L	01/08/02	AM
cis-1,4-Dichloro-2-butene	ND	1	20	ug/L	01/08/02	AM
m and p-Xylene	ND	1	5	ug/L	01/08/02	AM
n-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
n-Propylbenzene	ND	1	5	ug/L	01/08/02	AM
o-Xylene	ND	1	5	ug/L	01/08/02	AM
p-Isopropyltoluene	ND	1	5	ug/L	01/08/02	AM
sec-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
tert-Butylbenzene	ND	1	5	ug/L	01/08/02	AM
trans-1,2-Dichloroethene	ND	1	5	ug/L	01/08/02	AM
trans-1,3-Dichloropropene	ND	1	5	ug/L	01/08/02	AM
trans-1,4-Dichloro-2-butene	ND	1	20	ug/L	01/08/02	AM

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

ASSOCIATED LABORATORIES

QA REPORT FORM - METHOD 8260

Sample ID : 86117-404 water sample

Analysis Date: 01/08/02

Sample Matrix : WATER

Applies to: LR 85716, 85965, 86011, 86081, 86082, 86083, 86149, 86117, 86155

Reporting Units = ug/L

Matrix Spike / Matrix Spike Duplicate

Test	Sample Result	Spike Added	Matrix Spike	Matrix Spk. Dup	%Rec MS	%Rec MSD	RPD	QC Limits	
								RPD	%REC
1,1-Dichloroethene	ND	50	46.18	48.97	92	98	6	22	59-172
MTBE	ND	50	51.77	48.90	104	98	6	24	62-137
Benzene	ND	50	52.78	52.92	106	106	0	24	62-137
Trichloroethene	ND	50	57.69	60.71	115	121	5	21	66-142
Toluene	ND	50	51.61	53.30	103	107	3	21	59-139
Chlorobenzene	ND	50	49.82	50.22	100	100	1	21	60-133

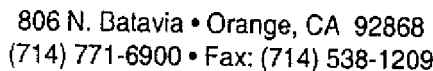
Sample ID : LCS # 3

Analysis Date: 01/08/02

LCS RECOVERY / METHOD BLANK

Test	Sample Result	Spike Added	LCS Spike	%Rec LCS	QC Limits
					%REC
1,1-Dichloroethene	ND	50	47.63	95	59-172
MTBE	ND	50	54.37	109	62-137
Benzene	ND	50	52.36	105	62-137
Trichloroethene	ND	50	67.40	135	66-142
Toluene	ND	50	52.06	104	59-139
Chlorobenzene	ND	50	50.86	102	60-133

Method Blank = All ND



CHAIN OF CUSTODY RECORD

Date 1/4/01 Page 1 of 1

[illegible]

NGSC-RWQCB012281



January 29, 2002

EEC
515 North Cabrillo Park Drive, #120
Santa Ana, California 92701

Attn: Mark Zeko

Subject: Report of Data: Case 37292

Results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Dear Mr. Zeko:

Two water samples for Project "S-487-8/2" were received January 5, 2002, in good condition. Written results are being provided on this January 29, 2002, for the requested analysis. All holding times were met.

For the EPA 8270C, 1,4-Dioxane analysis, the samples were extracted according to EPA method 3510C.

No unusual problems or complications were encountered with this sample set.

If you have any questions or require further information, please contact us at your convenience. Thank you for choosing APPL, Inc.

Sincerely,

Paula Young, Laboratory Director
APPL, Inc.

PY/rp
Enclosure
cc: File

Number of pages in this report: 5

EPA 8270C - 1,4-Dioxane

EEC
515 N. Cabrillo Park Dr. #120
Santa Ana, CA 92701

Attn: Mark Zeko
Project: S-487-8/2

Sample ID: NMW-9-120

Sample Collection Date: 1/4/02

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

ARF: 37292

APPL ID AP27139

QCG: \$827DI-020110A-43923

Method	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
EPA 8270C	1,4-Dioxane	1.5	1.0	ug/L	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (FBP)	81.7	22-121	%	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (NBZ)	79.9	38-121	%	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (TPH)	80.1	46-128	%	1/10/02	1/11/02

Run #: 31
Instrument: LINUS
Sequence: 020110
Dilution Factor: 1
Initials: MA

Printed: 1/16/02 12:18:23 PM

EPA 8270C - 1,4-Dioxane

EEC
515 N. Cabrillo Park Dr. #120
Santa Ana, CA 92701

Attn: Mark Zeko

Project: S-487-8/2

Sample ID: NMW-9-200

Sample Collection Date: 1/3/02

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

ARF: 37292

APPL ID AP27140

QCG: \$827DI-020110A-43923

Method	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
EPA 8270C	1,4-Dioxane	0.59 J	1.0	ug/L	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (FBP)	87.7	22-121	%	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (NBZ)	84.6	38-121	%	1/10/02	1/11/02
EPA 8270C	Surrogate recovery (TPH)	85.8	46-128	%	1/10/02	1/11/02

J Estimated value, below quantitation limit.

Run #: 32
Instrument: LINUS
Sequence: 020110
Dilution Factor: 1
Initials: MA

Printed: 1/16/02 12:18:23 PM

Method Blank
EPA 8270C - 1,4-Dioxane

Blank Name/QCG: 020110W - 43923
Batch ID: \$827DI-020110A

APPL Inc.
4203 West Swift Avenue
Fresno, CA 93722

Sample Type	Analyte	Result	PQL	Units	Extraction Date	Analysis Date
ANK	1,4-Dioxane	Not detected	1.0	ug/L	1/10/02	1/11/02
BLANK	Surrogate recovery (FBP)	79.6	22-121	%	1/10/02	1/11/02
ANK	Surrogate recovery (NBZ)	79.7	38-121	%	1/10/02	1/11/02
ANK	Surrogate recovery (TPH)	86.9	46-128	%	1/10/02	1/11/02

Run #: 28
Instrument: LINUS
Sequence: 020110
Initials: MA

Printed: 1/16/02 12:18:21 PM

Laboratory Control Spike Recoveries

EPA 8270C - 1,4-Dioxane

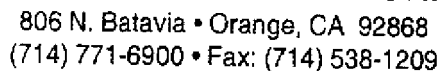
APPL ID: 020110W-27139 LCS - 43923
 Batch ID: \$827DI-020110A

APPL Inc.
 4203 West Swift Avenue
 Fresno, CA 93722

Compound Name	Spike Lvl ug/L	SPK Result ug/L	DUP Result ug/L	SPK % Recovery	DUP % Recovery	Recovery Limits	RPD %	RPD Limits
4-Dioxane	5.00	2.10	2.33	42.0	46.6	23-69	10.4	20
Surrogate recovery (FBP)	100	89.6	88.0	89.6	88.0	22-121		
Surrogate recovery (NBZ)	100	85.1	84.5	85.1	84.5	38-121		
irrogate recovery (TPH)	100	94.1	94.3	94.1	94.3	46-128		

omments:

Primary	SPK	DUP
Extraction Date :	1/10/02	1/10/02
Analysis Date :	1/11/02	1/11/02
Instrument :	LINUS	LINUS
Run :	29	30
Analyst :	MA	



Date 1-4-01 Page i of 1

NGSC-RWQCB012287

APPENDIX E

Waste Management Laboratory Data and Report



ASSOCIATED LABORATORIES

806 North Batavia - Orange, California 92868 - 714/771-6900

FAX 714/538-1209

CLIENT EEC

(6633)

LAB REQUEST 85133

ATTN: Mark Zeko

515 North Cabrillo Park Drive

Suite 120

Santa Ana, CA 92701

REPORTED 12/27/2001

RECEIVED 12/17/2001

PROJECT Y-12

SUBMITTER Client

COMMENTS "J" denotes value between MDL and DLR.

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.

314403

314404

Client Sample Identification

NMW-9-Soil

NMW-9

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,


Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

The reports of the Associated Laboratories are confidential property of our clients and may not be reproduced or used for publication in part or in full without our written permission. This is for the mutual protection of the public, our clients, and ourselves.

TESTING & CONSULTING

Chemical
Microbiological

Environmental

Lab request 85133 cover, page 1 of 1

NGSC-RWQCB012289

Order #: 314403

Client: EEC

Matrix: SOLID

Client Sample ID: NMW-9-Soil

Date Sampled: 12/17/2001

Time Sampled:

Sampled By:

Analyte

Result

DF

DLR

Units

Date/Analyst

260B Volatile Organic Compounds

1,1,1,2-Tetrachloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1,1-Trichloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1,2,2-Tetrachloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1,2-Trichloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1,2-Trichlorotrifluoroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1-Dichloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,1-Dichloroethene	ND	2	10.0	ug/Kg	12/18/01	DP
1,1-Dichloropropene	ND	2	10.0	ug/Kg	12/18/01	DP
1,2,3-Trichlorobenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,2,3-Trichloropropane	ND	2	10.0	ug/Kg	12/18/01	DP
1,2,4-Trichlorobenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,2,4-Trimethylbenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,2-Dibromo-3-chloropropane	ND	2	10.0	ug/Kg	12/18/01	DP
1,2-Dibromoethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,2-Dichlorobenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,2-Dichloroethane	ND	2	10.0	ug/Kg	12/18/01	DP
1,2-Dichloropropane	ND	2	10.0	ug/Kg	12/18/01	DP
1,3,5-Trimethylbenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,3-Dichlorobenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,3-Dichloropropane	ND	2	10.0	ug/Kg	12/18/01	DP
1,4-Dichlorobenzene	ND	2	10.0	ug/Kg	12/18/01	DP
1,4-Dioxane	ND	2	400.0	ug/Kg	12/18/01	DP
1-Chlorohexane	ND	2	10.0	ug/Kg	12/18/01	DP
2,2-Dichloropropane	ND	2	10.0	ug/Kg	12/18/01	DP
2-Butanone (MEK)	ND	2	200.0	ug/Kg	12/18/01	DP
2-Chloroethyl vinyl ether	ND	2	10.0	ug/Kg	12/18/01	DP
2-Chlorotoluene	ND	2	10.0	ug/Kg	12/18/01	DP
2-Hexanone	ND	2	10.0	ug/Kg	12/18/01	DP
4-Chlorotoluene	ND	2	10.0	ug/Kg	12/18/01	DP
4-Methyl -2- Pentanone	ND	2	10.0	ug/Kg	12/18/01	DP
Acetone	ND	2	10.0	ug/Kg	12/18/01	DP
Acetonitrile	ND	2	10.0	ug/Kg	12/18/01	DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report



Order #: 314403

Client: EEC

Matrix: SOLID

Client Sample ID: NMW-9-Soil

Date Sampled: 12/17/2001

Time Sampled:

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
8260B Volatile Organic Compounds					
Acrolein	ND	2	400.0	ug/Kg	12/18/01 DP
Acrylonitrile	ND	2	10.0	ug/Kg	12/18/01 DP
Allyl chloride	ND	2	10.0	ug/Kg	12/18/01 DP
Benzene	ND	2	10.0	ug/Kg	12/18/01 DP
Benzyl chloride	ND	2	10.0	ug/Kg	12/18/01 DP
Bromobenzene	ND	2	10.0	ug/Kg	12/18/01 DP
Bromochloromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Bromodichloromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Bromoform	ND	2	10.0	ug/Kg	12/18/01 DP
Bromomethane	ND	2	10.0	ug/Kg	12/18/01 DP
Carbon Disulfide	ND	2	10.0	ug/Kg	12/18/01 DP
Carbon tetrachloride	ND	2	10.0	ug/Kg	12/18/01 DP
Chlorobenzene	ND	2	10.0	ug/Kg	12/18/01 DP
Chloroethane	ND	2	10.0	ug/Kg	12/18/01 DP
Chloroform	ND	2	10.0	ug/Kg	12/18/01 DP
Chloromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Dibromochloromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Dibromomethane	ND	2	10.0	ug/Kg	12/18/01 DP
Dichlorodifluoromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Ethyl benzene	ND	2	10.0	ug/Kg	12/18/01 DP
Ethyl methacrylate	ND	2	10.0	ug/Kg	12/18/01 DP
Hexachlorobutadiene	ND	2	10.0	ug/Kg	12/18/01 DP
Iodomethane	ND	2	10.0	ug/Kg	12/18/01 DP
Isopropylbenzene (Cumene)	ND	2	10.0	ug/Kg	12/18/01 DP
Methacrylonitrile	ND	2	10.0	ug/Kg	12/18/01 DP
Methyl methacrylate	ND	2	10.0	ug/Kg	12/18/01 DP
Methyl-tert-butylether (MTBE)	ND	2	10.0	ug/Kg	12/18/01 DP
Methylene chloride	ND	2	10.0	ug/Kg	12/18/01 DP
Naphthalene	ND	2	10.0	ug/Kg	12/18/01 DP
Pentachloroethane	ND	2	10.0	ug/Kg	12/18/01 DP
Propionitrile	ND	2	10.0	ug/Kg	12/18/01 DP
Styrene	ND	2	10.0	ug/Kg	12/18/01 DP
Tetrachloroethene	ND	2	10.0	ug/Kg	12/18/01 DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 314403

Client: EEC

Matrix: SOLID

Client Sample ID: NMW-9-Soil

Date Sampled: 12/17/2001

Time Sampled:

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
8260B Volatile Organic Compounds					
Toluene	ND	2	10.0	ug/Kg	12/18/01 DP
Trichloroethene	ND	2	10.0	ug/Kg	12/18/01 DP
Trichlorofluoromethane	ND	2	10.0	ug/Kg	12/18/01 DP
Vinyl acetate	ND	2	100.0	ug/Kg	12/18/01 DP
Vinyl chloride	ND	2	10.0	ug/Kg	12/18/01 DP
Xylenes, total	ND	2	10.0	ug/Kg	12/18/01 DP
cis-1,2-Dichloroethene	ND	2	10.0	ug/Kg	12/18/01 DP
cis-1,3-Dichloropropene	ND	2	10.0	ug/Kg	12/18/01 DP
cis-1,4-Dichloro-2-butene	ND	2	10.0	ug/Kg	12/18/01 DP
m and p-Xylene	ND	2	10.0	ug/Kg	12/18/01 DP
n-Butylbenzene	ND	2	10.0	ug/Kg	12/18/01 DP
n-Propylbenzene	ND	2	10.0	ug/Kg	12/18/01 DP
o-Xylene	ND	2	10.0	ug/Kg	12/18/01 DP
p-Isopropyltoluene	ND	2	10.0	ug/Kg	12/18/01 DP
sec-Butylbenzene	ND	2	10.0	ug/Kg	12/18/01 DP
tert-Butylbenzene	ND	2	10.0	ug/Kg	12/18/01 DP
trans-1,2-Dichloroethene	ND	2	10.0	ug/Kg	12/18/01 DP
trans-1,3-Dichloropropene	ND	2	10.0	ug/Kg	12/18/01 DP
trans-1,4-Dichloro-2-butene	ND	2	10.0	ug/Kg	12/18/01 DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Lab Request 85133 results, page 3 of 6

NGSC-RWQCB012292

Order #: 314404

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9

Date Sampled: 12/17/2001

Time Sampled: 15:15

Sampled By:

Analyte

Result

DF

DLR

Units

Date/Analyst

8260B Volatile Organic Compounds

1,1,1,2-Tetrachloroethane	ND	1	5	ug/L	12/18/01	DP
1,1,1-Trichloroethane	ND	1	5	ug/L	12/18/01	DP
1,1,2,2-Tetrachloroethane	ND	1	5	ug/L	12/18/01	DP
1,1,2-Trichloroethane	ND	1	5	ug/L	12/18/01	DP
1,1,2-Trichlorotrifluoroethane	ND	1	5	ug/L	12/18/01	DP
1,1-Dichloroethane	ND	1	5	ug/L	12/18/01	DP
1,1-Dichloroethene	ND	1	5	ug/L	12/18/01	DP
1,1-Dichloropropene	ND	1	5	ug/L	12/18/01	DP
1,2,3-Trichlorobenzene	ND	1	5	ug/L	12/18/01	DP
1,2,3-Trichloropropane	ND	1	5	ug/L	12/18/01	DP
1,2,4-Trichlorobenzene	ND	1	5	ug/L	12/18/01	DP
1,2,4-Trimethylbenzene	ND	1	5	ug/L	12/18/01	DP
1,2-Dibromo-3-chloropropane	ND	1	5	ug/L	12/18/01	DP
1,2-Dibromoethane	ND	1	5	ug/L	12/18/01	DP
1,2-Dichlorobenzene	ND	1	5	ug/L	12/18/01	DP
1,2-Dichloroethane	ND	1	5	ug/L	12/18/01	DP
1,2-Dichloropropane	ND	1	5	ug/L	12/18/01	DP
1,3,5-Trimethylbenzene	ND	1	5	ug/L	12/18/01	DP
1,3-Dichlorobenzene	ND	1	5	ug/L	12/18/01	DP
1,3-Dichloropropane	ND	1	5	ug/L	12/18/01	DP
1,4-Dichlorobenzene	ND	1	5	ug/L	12/18/01	DP
1,4-Dioxane	ND	1	57	ug/L	12/18/01	DP
1-Chlorohexane	ND	1	5	ug/L	12/18/01	DP
2,2-Dichloropropane	ND	1	5	ug/L	12/18/01	DP
2-Butanone (MEK)	ND	1	100	ug/L	12/18/01	DP
2-Chloroethyl vinyl ether	ND	1	5	ug/L	12/18/01	DP
2-Chlorotoluene	ND	1	5	ug/L	12/18/01	DP
2-Hexanone	ND	1	20	ug/L	12/18/01	DP
4-Chlorotoluene	ND	1	5	ug/L	12/18/01	DP
4-Methyl -2- Pentanone	ND	1	10	ug/L	12/18/01	DP
Acetone	ND	1	100	ug/L	12/18/01	DP
Acetonitrile	ND	1	50	ug/L	12/18/01	DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report



Order #: 314404

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9

Date Sampled: 12/17/2001

Time Sampled: 15:15

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
260B Volatile Organic Compounds					
Acrolein	ND	1	200	ug/L	12/18/01 DP
Acrylonitrile	ND	1	10	ug/L	12/18/01 DP
Allyl chloride	ND	1	5	ug/L	12/18/01 DP
Benzene	ND	1	1	ug/L	12/18/01 DP
Benzyl chloride	ND	1	5	ug/L	12/18/01 DP
Bromobenzene	ND	1	5	ug/L	12/18/01 DP
Bromochloromethane	ND	1	5	ug/L	12/18/01 DP
Bromodichloromethane	1.9 J	1	5	ug/L	12/18/01 DP
Bromoform	6.6	1	5	ug/L	12/18/01 DP
Bromomethane	ND	1	5	ug/L	12/18/01 DP
Carbon Disulfide	ND	1	5	ug/L	12/18/01 DP
Carbon tetrachloride	ND	1	5	ug/L	12/18/01 DP
Chlorobenzene	ND	1	5	ug/L	12/18/01 DP
Chloroethane	ND	1	5	ug/L	12/18/01 DP
Chloroform	1.0 J	1	5	ug/L	12/18/01 DP
Chloromethane	ND	1	5	ug/L	12/18/01 DP
Dibromochloromethane	4.9 J	1	5	ug/L	12/18/01 DP
Dibromomethane	ND	1	5	ug/L	12/18/01 DP
Dichlorodifluoromethane	ND	1	5	ug/L	12/18/01 DP
Ethyl benzene	ND	1	5	ug/L	12/18/01 DP
Ethyl methacrylate	ND	1	50	ug/L	12/18/01 DP
Hexachlorobutadiene	ND	1	5	ug/L	12/18/01 DP
Iodomethane	ND	1	5	ug/L	12/18/01 DP
Isopropylbenzene (Cumene)	ND	1	5	ug/L	12/18/01 DP
Methacrylonitrile	ND	1	35	ug/L	12/18/01 DP
Methyl methacrylate	ND	1	5	ug/L	12/18/01 DP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	12/18/01 DP
Methylene chloride	ND	1	5	ug/L	12/18/01 DP
Naphthalene	ND	1	5	ug/L	12/18/01 DP
Pentachloroethane	ND	1	5	ug/L	12/18/01 DP
Propionitrile	ND	1	100	ug/L	12/18/01 DP
Styrene	ND	1	5	ug/L	12/18/01 DP
Tetrachloroethene	ND	1	5	ug/L	12/18/01 DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Order #: 314404

Client: EEC

Matrix: WATER

Client Sample ID: NMW-9

Date Sampled: 12/17/2001

Time Sampled: 15:15

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
8260B Volatile Organic Compounds					
Toluene	ND	1	5	ug/L	12/18/01 DP
Trichloroethene	ND	1	5	ug/L	12/18/01 DP
Trichlorofluoromethane	ND	1	5	ug/L	12/18/01 DP
Vinyl acetate	ND	1	50	ug/L	12/18/01 DP
Vinyl chloride	ND	1	5	ug/L	12/18/01 DP
Xylenes, total	ND	1	5	ug/L	12/18/01 DP
cis-1,2-Dichloroethene	ND	1	5	ug/L	12/18/01 DP
cis-1,3-Dichloropropene	ND	1	5	ug/L	12/18/01 DP
cis-1,4-Dichloro-2-butene	ND	1	20	ug/L	12/18/01 DP
m and p-Xylene	ND	1	5	ug/L	12/18/01 DP
n-Butylbenzene	ND	1	5	ug/L	12/18/01 DP
n-Propylbenzene	ND	1	5	ug/L	12/18/01 DP
o-Xylene	ND	1	5	ug/L	12/18/01 DP
p-Isopropyltoluene	ND	1	5	ug/L	12/18/01 DP
sec-Butylbenzene	ND	1	5	ug/L	12/18/01 DP
tert-Butylbenzene	ND	1	5	ug/L	12/18/01 DP
trans-1,2-Dichloroethene	ND	1	5	ug/L	12/18/01 DP
trans-1,3-Dichloropropene	ND	1	5	ug/L	12/18/01 DP
trans-1,4-Dichloro-2-butene	ND	1	20	ug/L	12/18/01 DP

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report

Lab Request 85133 results, page 6 of 6

NGSC-RWQCB012295

ASSOCIATED LABORATORIES
LCS REPORT FORM - METHOD 8260

Sample ID: LCS # 3
 Matrix: SOLID
 Analysis Date: 12/18/01
 Applies to: LR 84684, 85004, 85133
 Reporting Units = ug/Kg

LCS RECOVERY / METHOD BLANK

Test	Sample Result	Spike Added	LCS Spike	%Rec LCS	QC Limits %REC
1,1-Dichloroethene	ND	50	45.86	92	59-172
MIBK	ND	50	53.25	107	62-137
Benzene	ND	50	48.99	98	62-137
Trichloroethene	ND	50	47.44	95	66-142
Toluene	ND	50	44.92	90	59-139
Chlorobenzene	ND	50	50.43	101	59-139

Sample ID: 1 CS/LCSD - Soil Samples
 Analysis Date: 12/19/01

Lab Controlled Spike / Lab Controlled Spike Duplicate

Test	Sample Result	Spike Added	LCS Spike	LCS Spk. Dup	%Rec LCS	%Rec LCS D	RPD	QC Limits	
								RPD	%REC
1,1-Dichloroethene	ND	50	44.74	46.65	89	93	4	22	59-172
MIBK	ND	50	55.32	54.72	111	109	1	24	62-137
Benzene	ND	50	50.81	47.30	102	95	7	24	62-137
Trichloroethene	ND	50	48.17	49.76	96	100	3	21	66-142
Toluene	ND	50	50.52	52.18	101	104	3	21	59-139
Chlorobenzene	ND	50	51.30	50.20	103	100	2	21	60-133

Method Blank = All ND



ASSOCIATED LABORATORIES

806 N. Datavia • Orange, CA 92868
(714) 771-6900 • Fax: (714) 538-1209

85133

CHAIN OF CUSTODY RECORD

Date 12/17/01 Page 1 of 1

CLIENT <u>Environmental Engineering Co. Inc.</u>	PROJECT MANAGER <u>Mark Zeko</u>	Samples Intact Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> County Seals Intact Yes <input type="checkbox"/> No <input type="checkbox"/> Sample Ambient <input type="checkbox"/> Cooled <input checked="" type="checkbox"/> Frozen <input type="checkbox"/> Same Day <input type="checkbox"/> 24 Hr. <input checked="" type="checkbox"/> See below Regular <input type="checkbox"/> 48 Hr. <input type="checkbox"/>
ADDRESS <u>515 N. Cabrillo Park #120</u> <u>San Jose, CA 95128</u>	PHONE NUMBER <u>415 667-2300</u>	
PROJECT NAME <u>Y-12</u>	SAMPLER(S) (Signature) <u>[Signature]</u>	

SAMPLE NUMBER	LOCATION DESCRIPTION	DATE	TIME	SAMPLE TYPE			NO OF CNTNRS	SUSP. CONTAM.	TESTS REQUIRED
				WATER	AIR	SOLID			
NMW-9-sal	NMW-9	12/17/01				✓			8260 - Rush - 24 hr.
NMW-9	"	12/17/01	3:15	✓					8260

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date/Time <u>1530</u> <u>12-17-01</u>	I hereby authorize the performance of the above indicated work. <u>[Signature]</u> DISTRIBUTION: White with report. Yellow to AL, Pink to Courier
Relinquished by: (Signature) <u>[Signature]</u>	Received by Laboratory for analysis: (Signature) <u>[Signature]</u>	Date/Time	
Special Instructions: <u>24-hour rush on NMW-9-sal</u>			

NGSC-RWQCB012297



ASSOCIATED LABORATORIES

806 North Batavia - Orange, California 92868 - 714/771-6900

FAX 714/538-1209

CLIENT EEC (6633)

ATTN: Mark Zeko

515 North Cabrillo Park Drive

Suite 120

Santa Ana, CA 92701

LAB REQUEST 85328

REPORTED 12/21/2001

RECEIVED 12/19/2001

PROJECT S487-812

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.

315036

Client Sample Identification

NMW-9-Soil

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behar, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

The reports of the Associated Laboratories are confidential property of our clients and may not be reproduced or used for publication in part or in full without our written permission. This is for the mutual protection of the public, our clients, and ourselves.

TESTING & CONSULTING

Chemical

Microbiological

Environmental

Lab request 85328 cover, page 1 of 1

NGSC-RWQCB012298

Order #: 315036

Client: EEC

Matrix: SOLID

Client Sample ID: NMW-9-Soil

Date Sampled: 12/19/2001

Time Sampled: 11:30

Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
8015 TEPH Diesel					
TEPH Diesel	ND	1	10.0	mg/Kg	12/20/01 PH
8015M - Total Petroleum Hydrocarbons					
Gasoline	ND	1	5	mg/Kg	12/19/01 AF

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

ASSOCIATED LABORATORIES Analytical Results Report



ASSOCIATED LABORATORIES
QA REPORT FORM

QC Sample: LR 85326-033

Matrix: Solid

Prep. Date: 12/19/01

Analysis Date: 12/20/01

ID#'s in Batch: LR 85328, 85326, 85223, 85232, 85252

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Reporting Units = mg/Kg

Test	Method	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	RPD
TPH	8015M-G	ND	2	1.60	1.50	80	75	6.5

ND = Not Detected

RPD = Relative Percent Difference of Matrix Spike and Matrix Spike Duplicate

%REC-MS & MSD = Percent Recovery of Matrix Spike & Matrix Spike Duplicate

%REC LIMITS = 70 - 130

RPD LIMITS = 30

PREPARATION BLANK / LAB CONTROL SAMPLE RESULTS

	PREP BLK					
	Value	Result	True	%Rec	L.Limit	H.Limit
LCS	ND	1.0	1	100	80%	120%
LCSD	ND	1.0	1	100	80%	120%

LCS Result = Lab Control Sample Result

True = True Value of LCS

L.Limit / H.Limit = LCS Control Limits

SURROGATE RECOVERY

Sample No.	AAA-TFT
QC Limit	55-156
MS	156
MSD	143
Method Blank	95
LCS	132
LCSD	128

AAA-TFT = a,a,a-Trifluorotoluene

12/26/2001

8015g_tph_1219s

NGSC-RWQCB012300

ASSOCIATED LABORATORIES
LCS REPORT FORM

QC Sample: LCS 122001S

Matrix: SOLID

Prep. Date: 12/20/01

Analysis Date: 12/21/01

ID#'s in Batch: LR 85328

LAB CONTROLLED SPIKE / LAB CONTROLLED DUPLICATE RESULT

Reporting Units = mg/Kg

Test	Method	Method Blank	Spike Added	LCS Spike	LCSD Spk. Dup	%Rec LCS	%Rec LCSD	RPD
DIESEL	8015D	ND	500	401	417	80.2	83.4	3.9

ND = Not Detected

LCS Result = Lab Control Sample Result

%REC-LCS & LCSD = Percent Recovery of LCS Spike & LCS Spike Duplicate

RPD = Relative Percent Difference of LCS Spike and LCS Spike Duplicate

%REC LIMITS = 70 - 130	
RPD LIMITS = 30	

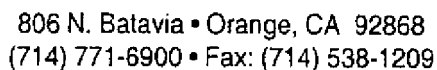
SURROGATE RECOVERY

Sample No.	O-Terphenyl
QC Limit	55-156
Method Blank	96
LCS	112
LCSD	110

12/27/2001

8015d_lcsd_1220s

NGSC-RWQCB012301



Date 12/19/01 Page 1 of 1

NGSC-RWQCB012302